Central Ohio River Basin Report

In Cooperation With The Ohio Department Of Natural Resources

United States Department of Agriculture

Soil Conservation Service

Forest Service

Economic Research Service

CENTRAL OHIO RIVER BASIN
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Preface

The United States Department of Agriculture (USDA) was requested by the State of Ohio, Department of Natural Resources (ODNR), to participate in a cooperative study of the Central Ohio River Basin (CORB). The primary objective of this study is to prepare a long-range plan that will facilitate the orderly development, use, and management of the water and related land resources.

The survey was performed under cooperative agreement with the ODNR, which had responsibility to define the objectives of the study related to state and local needs.

The USDA participated in this study under the authority contained in Section 6 of Public Law 566, 83rd Congress, as amended. This act authorizes the Secretary of Agriculture to cooperate with other federal, state, and local agencies in their investigations of watersheds, rivers, and other waterways to develop coordinated programs.

The USDA agencies involved in the study are the Soil Conservation Service (SCS), Economic Research Service (ERS), and the U.S. Forest Service (FS), which participated under provisions of a Memorandum of Understanding dated February 2, 1956, and revised April 15, 1968.

The study was carried out under general guidance of the USDA Field Advisory Committee (FAC), composed of representatives of the SCS, ERS, and FS. The SCS representative chaired the committee and provided overall leadership to the study. Personnel assigned to the CORB survey functioned as a team under the guidance of the FAC. Each agency had specific responsibilities for certain aspects of the study as outlined in the CORB Plan of Work dated June 1979.

In addition to the USDA and the ODNR, the following federal and state agencies and organizations made contributions to the study:

Federal

Corps of Engineers*

Environmental Protection Agency*

Department of Housing and Urban Development*

Department of Commerce*

Department of the Interior*

Department of Transportation*

Ohio River Basin Commission

State

Ohio Department of Transportation

Ohio Environmental Protection Agency (OEPA)

Also, local organizations and private interest groups, including counties, municipalities, conservancy districts, soil and water conservation districts, planning commissions, business, labor, agriculture, civic organizations, academic and cultural communities, historical societies, and conservation and preservation groups participated.

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* Member of National Water Resource Council.

SUMMARY

This report presents the results of the Central Ohio River Basin (CORB) Survey conducted by the U.S. Department of Agriculture and the Ohio Department of Natural Resources. The principal objectives of the basin study were to:

1. Identify the basic soil and water related resource problems;

2. Provide information on the quantity and quality of the basin's soil related natural resources;

3. Identify and evaluate alternatives for reducing soil resource problems and meeting food and fiber production needs;

4. Identify opportunities and strategies available to federal, state, and local agencies to alleviate resource problems.

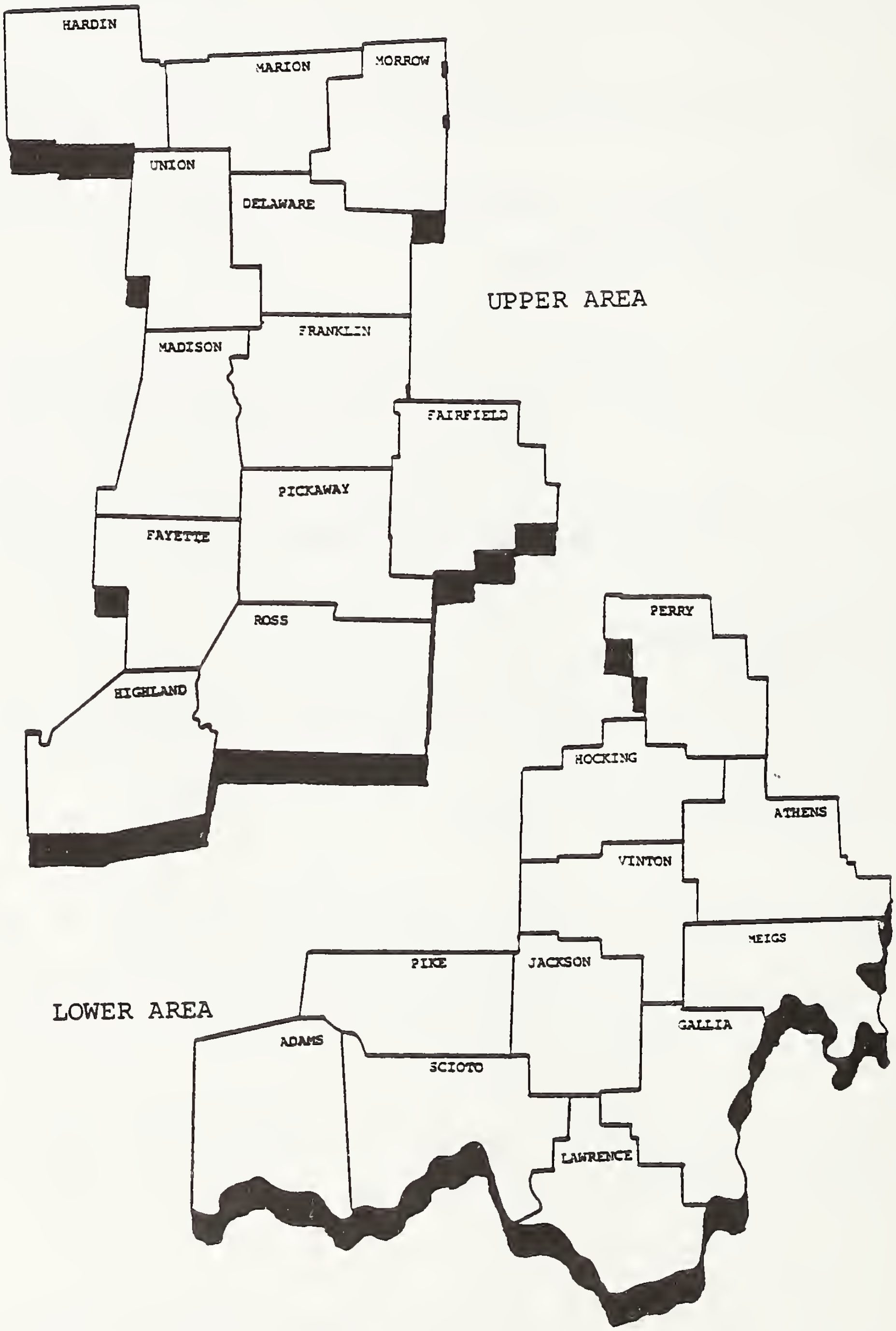
Location and Description

The CORB extends from central to southern Ohio. It contains 14 complete counties and portions of 23 others. A total of 23 counties have 50 percent or more of their area within the basin.

The Scioto River drainage is the largest in the basin with 6,510 square miles. The second largest single drainage area in the basin is the Hocking River with 1,200 square miles. The remaining 3,270 square miles are drained by small tributaries of the Ohio River.

The basin was divided into two subbasins a lower and upper basin for planning purposes (see map).

Central River Basin Study Area



Recommendations for Implementation

Recommendations were made to solve erosion problems for each of the 23 counties in the basin. A strategy was proposed to solve the sheet and rill erosion problems by installing resource management systems that conserve soil and do not have negative economic effect on farming operations.

The types of action needed include field office personnel training, public information activities, and structuring annual workload with a priority of providing conservation tillage assistance. The resource management systems with the highest net returns and best erosion control usually involve conservation tillage.

Specific recommendations are made for a strategy in each county as well as for the total basin.

Problems and Concerns

The major identified soil and water resource problems in the basin include excessive soil erosion and sedimentation, loss of prime farmland, poor soil drainage, and flooding.

Erosion is a problem on over one million acres of cropland, or 36 percent of the total cropland. Erosion is also a problem on 135,000 acres of pasture and 370,000 acres of forest land.

This erosion problem is a threat to the productivity of the resource base. Loss of topsoil or cropland decreases yields and increases production costs.

About 57,000 acres of prime farmland will be converted to urban uses and lost to agriculture by the year 2000. Approximately 1.2 million acres of cropland are in need of drainage installation in order to optimize productivity and install resource management systems. About one-half of this area will need drainage for conservation purposes. Flooding is a problem on about 100,000 acres of cropland.

Alternatives

Four alternative plans for the future, around the year 2000, are discussed. Each of the plans stresses one of the following objectives or sets of conditions:

1. Accelerated conservation treatment without new water related projects.

2. Future conditions assuming continuation of on-going programs and projects.

3. Emphasized national economic development.

4. Enhanced environmental quality.

A preferred alternative was not selected. Instead county strategies were developed to address the severe erosion problems in the basin. There is no authority in the basin to implement a comprehensive basin-wide plan. County problems and strategies to solve them are addressed in Chapter I.

Appendix A

This appendix contains a detailed description of the basin's natural resources.

Appendix B

Appendix B contains soil resource management information.

CHAPTER I

RECOMMENDATIONS FOR IMPLEMENTATION

Implementation of programs for developing and using the basin's soil and water resources should be coordinated by community, city, county, area, state, and federal entities. The leadership for coordinating and implementing plan elements dealing with land treatment and erosion control should be provided by the Soil Conservation Service and local soil and water conservation districts.

County reliable statistical data were collected in 1979 to replace the 1967 Conservation Needs Inventory. The data provided a current assessment of land use, conservation treatment needs, soil erosion, flooding, and other concerns in the basin. The inventory identified and located problems in the basin and quantified the resource base.

Four alternatives were analyzed by applying four sets of assumptions involving land use and levels of conservation treatment for the upper and lower basins. The effects of the four alternatives revealed the following:

1. Increasing the acreage of conservation tillage systems on erodible soils greatly reduces soil erosion and increases farm income using similar crop rotations;

2. Subsurface drainage is an extremely profitable practice.

Conservation tillage technology, either in the form of no-till or chisel disc systems, makes it possible to reduce soil loss to rates below tolerable limits (T) on a large portion of all cropland, while increasing the net return to the farmer. Based on these general conclusions, management considerations, county strategies, and technical assistance needs were developed to solve erosion problems on the erodable soil resource groups in each county.

The soil resource groups (SRGs) listed in Tables I.1 and I.2 are groups of soils with similiar management needs and productivity characteristics. They contain most of the eroding cropland in the basin. These tables indicate the most cost effective resource management system for each soil resource group. More detailed resource management system information for each soil resource group can be found in Appendix B for the upper and lower basins. The cropland erosion problems in the basin can be solved by installing the recommended resource management systems.

Table I.1 - Upper Area Cropland

Soil Series	SRG	Capability Class	Slope	Recommended Resource[1/] Management System
Alexandria, Cardington Celina, Lewisburg, Miamian, Ockley, Thackery, Wea	G	IIe	B 2-6%	(1) RRR No-Till (2) RRR Chisel Disc
Cincinnati, Glynwood Milton, Morley, Nicholson, Rossmoyne, St. Clair	I	IIe	B 2-6%	(1) RRR No-Till (2) RRRG No-Till (3) RRRG Chisel Disc
Crosby, Haubstadt, Odell, Rittman, Sleeth	J	IIw	A 0-2%	(1) RRR Chisel Disc (2) RRR Spring plow if contoured Drainage system needed
Avonburg, Bennington, Blount, Rossmoyne	K	IIw	A 0-2%	(1) RRR Chisel Disc (2) RRR Fall or Spring plow if contoured
Bennington, Blount, Crosby, McGary, Odell	L	IIe	B 2-6%	(1) RRR Chisel Disc (2) RRR No-Till
Bonpas, Brookston, Kokomo, Marengo, Patton, Pewamo Westland, Wetzel	M	IIw	A 0-2%	(1) RRR Chisel Disc (2) RRR Fall Plow (3) RRR Spring Plow
Alexandria, Cana, Cardington, Haubstadt, Miamian, Ockley, Otwell, Rittman	N	IIIe	C 6-12%	RRRG No-Till

(Continued)

Table I.1 (Continued)

Soil Series	SRG	Capability Class	Slope	Recommended Resource[1/] Management System
Alexandria, Cana, Hanover, Haubstadt Miamian, Otwell	U	IVe	D 12-18%	Permanent Soil Cover
Alexandria, Latham, Miamian, Hennepen Morley	X,Y	VI, VII	18%	Permanent Soil Cover

Source: CORB Natural Resources Inventory

1/ Water disposal structures such as grassed waterways are needed in areas of concentrated water flow.

Table I.2 - Lower Area Cropland

Soil Series	SRG	Capability Class	Slope	Recommended Resource[1/] Management System
Chagrin, Genesee, Huntington, Nolin, Pope, Ross, Tioga	A	I	A 0-2%	RRR Spring Plow RRR Chisel Disc
Chagrin, Genesee, Lindside, Moshannon, Newark, Orrville, Philo, Pope, Skidmore, Stendel	B	IIw	A 0-2%	RRR Chisel Disc RRR No-Till
Alexandria, Allegheny, Cana, Cardington, Colerain, Glenford, Mentor, Monongahela, Otwell, Parke, Pike, Sciotoville, Vincent, Wheeling, Williamsburg	G	IIe	B 2-6%	RRGM No-Till RRG No-Till RRGMM No-Till
Alford, Eldean, Fox, Gilpin, Hayter, Jessup, Louden, Lowell, Muren, Muskingum, Tilsit, Wellston, Zanesville	H	IIe	B 2-6%	RRGM No-Till RRG No-Till
Beasley, Bedford, Bratton, Cedarville, Chili, Cincinnati, Clymer, Coolville, Corydon, Guernsey, Heitt, Rarden, Rossmoyne, Westmoreland	I	IIe	B 2-6%	RRGM No-Till RRG No-Till
Alexandria, Allegheny, Cardington, Colerain, Elkinsville, Gallia, Licking, Loudonville, Markland, Mentor, Monongahela, Otwell, Parke, Pike, Pope, Vincent	N	IIIe	C 6-12%	RGMM No-Till RGMMM No-Till

(Continued)

Table I.2 (Continued)

Soil Series	SRG	Capability Class	Slope	Recommended Resource[1/] Management System
Dekalb, Gilpin, Hayter, Hazelton, Jessup, Loudon, Lowell, Muskingum, Rayne, Rigley, Wellston, Woolper, Zaleski, Zanesville	O	IIIe	C 6-12%	RGMM No-Till RGMMM No-Till RGMM Chisel Disc
Beasley, Bedford, Bratton, Chili, Cincinnati, Clymer, Coolville, Culleoka, Edenton, Guernsey, Hagers-town, Heitt, Keene, Latham, Lawshe, Opequon, Pembroke, Rarden, Rossmoyne, Shelocta, Tuscarawas, Westmoreland, Woodsfield	P	IIIe	C 6-12%	RGMM No-Till RGMMM No-Till RGMMM Chisel Disc
Berks, Dekalb, Gilpin, Hazelton, Hayter, Jessup, Ladig, Lowell, Muskingum, Rayne, Rigley, Wellston, Zaleski	V	IVe	D 12-18%	RGMMM No-till
Bethesda, Brookside, Cincinnati, Clymer, Culleoka, Edenton, Fair-mont, Fairport, Guernsey, Heitt, Latham, Lawshe, Nagley, Rarden, Tuscarawas, Upshur, Vandalia, Westmoreland	W	IVe	D 12-18%	RGMMM No-Till
Berks, Westmoreland, Upshur	X&Y	VI&VII		Permanent Cover Only

Source: CORB Natural Resource Inventory

1/ Water disposal structures such as grassed waterways are needed in areas of concentrated water flow.

Eroding pastureland and forest land is generally located in capability Classes IV, VI, and VII. These are soils on steep slopes and very susceptible to severe erosion when mismanaged through poor grazing practices on pastureland and when abused through forest land grazing and improper forest harvesting. It is important to solve these problems in order to conserve the resource base.

Resource Problems By County

Acres of land eroding over tolerable limits (T) are listed by land use for each county in the lower and upper basins in Table I.3. The percent of each land use eroding over "T" is also shown. These data were used to assign counties into priority groups based on the severity and extent of erosion problems. Cropland needs weighted heavier than pasture and forest land needs.

Table I.4 lists the counties by priority groups. The problem SRGs from Tables I.1 and I.2 within each county are listed in the third column. Management considerations necessary to install resource management systems based primarily on the soil types present were coded and are listed in the fourth column of Table I.4. The explanations of these codes are located on pages 1-8 and 9. All of this information was evaluated and general county strategies were developed. The objective of all strategies is to reduce all cropland, pastureland, and forest land erosion to tolerable levels. These strategies are included on pages 1-10 through 1-16.

The technical needs to install the conservation practices by county were then estimated according to the types of practices needed and the quantities of acres treated.

Table 1.3 - CORB Acres and Percent Eroding at Rates Over "T" by Land Use by County

County	Cropland		Pasture		Forest		Total	
	Acres Over T	% Over T	Acres Over T	% Over T	Acres Over T	% Over T	Acres Over T	% Over T
Delaware	70,615	43	846	6	423	2	71,884	26
Fairfield	77,417	41	6,570	21	10,322	23	94,309	29
Fayette	90,813	41	-	-	-	-	90,813	35
Franklin	51,618	46	-	-	-	-	51,618	15
Hardin	104,288	43	888	7	-	-	105,176	35
Highland	83,659	37	4,760	15	14,060	31	102,479	30
Madison	104,656	43	-	-	440	5	105,096	35
Marion	22,919	11	-	-	-	-	22,919	9
Morrow	72,327	45	381	2	381	1	73,089	28
Pickaway	66,071	26	479	3	958	9	67,508	21
Ross	67,780	38	2,033	9	18,981	11	88,794	20
Union	78,595	39	-	-	439	2	79,034	28
Upper Area Total	**890,758**	**37**	**15,957**	**8**	**46,004**	**11**	**952,719**	**26**
Adams	46,239	54	19,821	30	15,965	8	82,025	45
Athens	8,260	22	17,439	24	15,602	10	41,301	13
Gallia	11,571	25	9,640	18	37,794	25	59,005	20
Hocking	11,539	32	15,815	49	17,047	11	44,451	18
Jackson	4,369	11	-	-	21,845	14	26,214	10
Lawrence	4,032	22	4,769	26	45,479	31	54,280	23
Meigs	17,737	35	26,381	56	12,973	8	57,091	20
Perry	22,072	32	11,034	48	51,915	53	85,021	35
Pike	15,930	32	5,917	15	56,896	37	78,743	32
Scioto	7,247	21	2,588	8	34,175	14	44,010	12
Vinton	1,485	8	5,940	20	15,597	9	23,022	9
Lower Area Total	**150,481**	**31**	**119,344**	**26**	**325,338**	**18**	**595,163**	**19**
BASIN TOTAL	**1,041,239**	**36**	**135,301**	**20**	**371,342**	**17**	**1,547,882**	**23**

Source: CORB Resources Inventory

Table I.4 - CORB County Erosion Strategies

Counties ranked in priority groups according to acreages of excessive erosion

Counties	Priority	Problem 1/ SRGs	Management 2/ Considerations	County 3/ Strategy	Technical 4/ Needs (Man/Years)
Madison	1	L, G	a,b,e,g	1	58
Highland	1	G,N,O,P,S,U	b,c,e,g	2	70
Hardin	1	I, L	a,b,e,g	1	58
Fairfield	1	G,L,N,U	b,c,e,g	2	65
Ross	1	G,L,N,U	b,c,e,g	2	57
Fayette	1	G,L,N,U	a,b,c,e,g	1	51
Union	1	I,L	a,b,e,g	1	44
Morrow	2	G,I,L,N	a,b,c,d,e,g	3	60
Pickaway	2	G,N	a,b,e,g	4	55
Delaware	2	L,G,I,N	a,b,c,e,g	3	39
Adams	2	H,I,P,W,X	c,g	5	39
Franklin	2	G,L,N	a,b,e,g	3	25
Perry	3	H,P,W,X	c,f,g	5	22
Marion	3	I,L	a,b,e,g	8	13
Gallia	3	O,U,V,W,X,Y	c,f,g	6	12
Hocking	3	O,U,V,W,X,Y	c,f,g	6	12
Meigs	3	O,U,V,W,X,Y	c,f,g	6	18
Pike	3	I,P,V,W,X,Y	c,g	6	16
Athens	3	O,U,V,W,X,Y	c,f,g	6	9
Scioto	4		f	7	7
Jackson	4		f	7	5
Lawrence	4		f	7	4
Vinton	4		f	7	3

1/ Listed on Table I.1 and I.2 (pages 1-2-4)

2/ Listed on Management Considerations Key (pages 1-8, 9)

3/ Listed in County Strategy Key (pages 1-10-16)

4/ Includes total man-years necessary to solve erosion control needs on all cropland and pastureland.

Management Considerations Key

a. The soils of SRGs K and L have drainage and erosion problems. The recommended resource management systems for erosion control must be combined with adequate drainage if they are to work effectively. These SRGs may be associated with soils of SRG M, which also must have adequate drainage.

b. The well drained soils of SRGs G and I may be associated with poorly drained soils from SRGs J, K, L, and M which must have adequate drainage for the recommended resource management system to work. If more than 20 percent of a field is in these poorly drained soils, the chisel disc conservation resource management system is recommended.

c. SRGs N, O, P, U, V, and W may be managed with a no-till continuous corn system. However, when slopes exceed 25 percent, it is recommended that permanent soil cover be used.

d. The soil survey is currently in progress. The lack of complete mapping requires cooperation between soil scientists in the county and field office personnel. The varied soil conditions make it imperative that the conservation planner know exactly what soil he is working with.

e. Special care should be taken to detect erosion occurring on somewhat poorly drained soils of SRGs J and K. With conventional tillage and continuous row crops, they may exceed "T" on one percent slope. They could be much better managed with a chisel disc conservation tillage system.

f. The county is located in the strip mined portion of the basin. Mined areas contain some tremendous erosion problems with off-site sediment damage. Any solution to these problems are non-agricultural in nature.

g. Large areas of SRGs G, I, N, O, P, and V in the county will require grassed waterways in areas of concentrated water flow.

County Strategies Key

1. Madison, Hardin, Fayette, and Union Counties

The primary erosion problem in these counties are on soils developed on 2-6 percent slopes on cultivated cropland. These soils are farmed intensively. Fall and spring conventional tillage are common practices. About 40 percent of all cropland is eroding greater than "T". The strategy needed to solve the problem would contain the following elements:

(1) Promotion of chisel disc conservation tillage. This will allow greater net returns per acre and will not cause disruption of rotations.

(2) Continue to encourage drainage along with conservation tillage (see Management Considerations). Devote time to training contractors to install tile with a minimum of guidance from the SWCD.

(3) Work in targeted areas first, in order to make the most effective use of resources.

(4) The opportunities for no-till are limited to a few large areas of the well drained soils in SRG G or I.

(5) Continue to encourage and assist with the installation of grassed waterways in areas of concentrated water flow on cropland.

(6) Accelerate the public information program, stressing the advantages of conservation tillage.

2. Highland, Fairfield, and Ross Counties

These counties are located in the transition zone between glaciated and non-glaciated soils. As might be expected, they contain a variety of soils. The most severe erosion occurs on glaciated soils which are intensively cropped. Severe erosion problems appear on slopes as low as two percent and become much worse as slopes approach 18 percent. The strategy needed to solve the major erosion problems would include:

(1) Promotion of No-Till. This will increase the net return per acre on approximately 30,000 acres of cropland eroding at rates higher than 10 tons/acre per year. These soils are well drained and as a rule may be managed quite effectively with a no-till continuous corn system.

(2) Promote chisel disc conservation tillage on poorly drained soils over two percent slope which are eroding at rates slightly over "T". Chisel disc can also be successfully employed on soils which are well drained in SRG G but are associated in the same field with poorly drained soils in SRG M.

(3) Continue to encourage and assist with the installation of grassed waterways in areas of concentrated water flow on cropland.

(4) Accelerate public information program stressing the advantages of conservation tillage.

(5) Train all SCS and district personnel on the advantages and proper installation of different conservation tillage systems on the widely varied soil conditions present.

(6) Local areas of pasture erosion are present similar to those in the unglaciated counties. They should be recognized and corrected where possible. This pasture problem is not nearly as severe as cropland erosion.

(7) Provide assistance and education to land users on forest management. Forest land erosion is a problem where forests have been mismanaged by livestock grazing and improper logging practices.

3. Morrow, Delaware, and Franklin Counties

The soil erosion problem in these counties is less than in priority one counties only because the acreage of cropland is smaller. The problem areas in these counties can be treated with conservation tillage. Most of the problems occur on SRGs G and L. Between 10 and 20 percent of the areas eroding over "T" are in SRG N. The strategy for correcting erosion problems in the county would include the following elements:

(1) It is especially important that field office personnel be familiar with the varied soil conditions of their county and are able to apply the best conservation tillage system for each situation (see Management Considerations).

(2) Conservation tillage systems can solve most of the soil erosion problems with increased net returns and no disruption of cropping patterns or rotations.

(3) Drainage systems should be installed where necessary (see Management Considerations).

(4) Continue to encourage and assist with the installation of grassed waterways in areas of concentrated water flow on cropland.

(5) Accelerate public information program, stressing the economic advantages of conservation tillage.

4. Pickaway County

The erosion problems in this county occur on slopes from 2 percent to 12 percent which are intensively cropped. All the cropland on slopes greater than 6 percent and about 80 percent of the cropland on slopes greater than 2 percent is well drained. Most of the erosion problems could be solved with no-till systems or chisel disc systems. However, proper no-till management yields the highest net return per acre in most cases. The strategy needed to solve the erosion problems in the county would include the following elements:

(1) Promotion of conservation tillage with an emphasis on well managed no-till. Chisel disc is recommended where soil drainage is poor; drainage systems should be installed (see Management Considerations).

(2) Continue to encourage drainage along with conservation tillage (see Management Considerations). Devote time to training contractors to install tile with a minimum of guidance from the SWCD.

(3) Continue to encourage and assist with the installation of grassed waterways in areas of concentrated water flow on cropland.

(4) Accelerate public information program, stressing the economic advantages of conservation tillage.

5. Adams and Perry Counties

The soil erosion problem in these counties is located on the transition between the glaciated and unglaciated regions of Ohio. Problem soils are well drained and usually above 8 percent slope. No till systems can be used to control cropland erosion. The counies have a pasture erosion problem on SRGs P, W, and X. A strategy to solve the erosion problems would include the following elements:

(1) Promotion of no-till conservation tillage systems. Through these systems it is possible to effectively manage over 15 percent of the total cropland in the county which is eroding at rates higher than 10 tons/acre/year. No-till can be used on most of the upland soils with a slope greater than 3 percent.

(2) Train all field office personnel on the proper no-till procedures for the various soil conditions in the county.

(3) Accelerate pasture protection practices to solve the erosion on pastureland.

(4) The topography of this county is subject to critical erosion, usually in areas of man's disturbance. These are hard to treat because they cannot be corrected without major earthmoving and tree planting activities. This would require cost-sharing assistance through some sort of project action.

(5) Continue to encourage and assist with the installation of grassed waterways in areas of concentrated water flow on cropland.

(6) Accelerate the public information program to educate farmers on the economic advantages of conservation tillage.

(7) Forest land erosion is a problem in the county due to grazing and improper logging practices. Assistance and education should be provided to land users on forest management. Special attention should be applied to class VI and VII land.

6. Gallia, Hocking, Meigs, Pike, and Athens Counties

These lower basin counties have a mixture of problems. Erosion levels above "T" occur on forest land, pastureland, and cropland. The only problems that the field offices can deal with effectively are on cropland and pastureland. The strategy needed to solve the erosion problems would include the following elements:

(1) Promotion of no-till conservation tillage by the SWCD on class III and IV land. This will increase the net return per acre and usually allow a more intense rotation while still maintaining the resource base.

(2) Continue to encourage and assist with the installation of grassed waterways in areas of concentrated water flow on cropland.

(3) Accelerate pasture programs in order to identify and treat problem areas in pastures.

(4) Maintain public information program that will stress the economic advantages of soil conservation in general.

(5) Forest land erosion is a problem due to grazing and improper logging practices. Assistance and education should be provided to land users on forest management. Special attention should be applied to class VI and VII land.

7. Scioto, Jackson, Lawrence, and Vinton Counties

These counties have minimal soil and water conservation problems on cropland and pastureland. The total cropland and pastureland in each county that is eroding at rates higher than "T" is less than 10,000 acres, or 5 percent of the total county acreage. Forest land erosion is a problem where forests have been mismanaged by livestock grazing and improper logging practices. Assistance and education should be provided to land users on forest management. Special attention should be applied to class VI and VII land.

8. Marion County

This county has fewer erosion problems than the surrounding counties. Slopes on cropland are very level with only about 10 percent of the total cropland located on slopes greater than 2 percent. A strategy to treat the erosion problem would include the following elements:

(1) Promotion of chisel disc conservation tillage. This will allow greater net return per acre on flatter, wetter soils and will not cause a disruption of rotations.

(2) Continue to encourage drainage along with conservation tillage (see Management Considerations).

(3) Actively work in the areas of the county which contain gently rolling cropland.

(4) Continue to encourage and assist with the installation of grassed waterways in areas of concentrated water flow on cropland.

(5) Accelerate the public information program stressing the advantages of conservation tillage.

Summary of Basin Strategy

The conservation tillage systems discussed in county strategies are increasing gradually and can be expected to continue to increase in the future. Without a concerted effort in technical assistance and management training of operators, this increase will be slow and sporadic. It seems prudent that SCS and SWCD target their programs to give maximum assistance to the conversion of conservation tillage systems. This would facilitate better managed and more profitable farm operations. To provide the needed technical assistance, the following adjustments of our program administration are required:

Training: The general level of expertise of field office personnel in conservation tillage application must be improved. All field office personnel must be familiar with every aspect of a sound conservation tillage program such as: soils, chemicals, tillage equipment, drainage, and various tillage systems. Each employee must be able to advise farmers on the best management for all existing conditions. It is recommended that a soil conservationist with expertise in conservation tillage systems be placed in the Circleville Area Office. The sole purpose of the position should be to provide training and assistance in conservation tillage to field office personnel throughout the basin.

Staffing Level: Table I.4 divides all counties into priority groups, identifies problem SRGs, and indicates appropriate county strategies. It contains an estimate of the total staff years of technical assistance needed to solve existing problems. Current staffing must be revised to handle the problem. Field office personnel should be added to all priority one and two counties. General staffing trends should be to relocate employees from the lower to the upper basin where most of the erosion problems occur.

Workload Analysis: Field office personnel must be able to provide assistance during the planting season. The number of new acres converted to conservation tillage systems each year will vary with the size of operations, type of system, as well as all other management factors. It is estimated that on an average an employee will be able to assist with 1,200 acres of no-till or 1,800 acres of chisel disc systems during each planting season in priority one and two counties as shown in Table I.4. All field office personnel should reserve the entire planting season for providing on-site field assistance.

During the rest of the year emphasis should be placed on activities supportive of conservation tillage.

On-going Program: Lower basin counties with grazed woodland problems should place emphasis on livestock exclusion practices. All field activities should be evaluated in light of major erosion problems. Those activities and functions that do not address significant identified problems should receive a low priority.

Drainage: There are about 1.2 million acres in the basin with drainage needs, most of which could be resolved profitably with some type of drainage system. Over 96 percent of these acres are in the upper basin. Modern drainage installation equipment, when properly used by knowledgeable contractors, has made it possible to install drainage systems with minimum technical input from SCS. Current trends indicate that the amount of drainage installed without SCS assistance is increasing. Adequate drainage is essential to conservation tillage. Over half of the acres in the upper basin needing drainage are soils which could best be managed with conservation tillage or occur in fields associated with soils needing conservation tillage. Drainage assistance by SCS should be limited to soils needing conservation tillage.

Public Information: The informational program is critical to timely conversion to conservation tillage systems. There should be a continuous low-key media campaign with increased tempo on specific items at various times of the year, i.e., emphasis on residue management at harvest time, limited till methods at fall plowing time, chemical applications and no-till planting in the late winter and early spring, etc. There should also be a regular format of tours, workshops, and other such operator participation type activities. A visual program in public and commercial establishments would also be effective.

Program Progress:

Phase I - Staffing and training. This is a build-up phase needed to place trained, qualified people in problem areas. This gear up phase will take three to five years to complete.

Phase II - Start up. Progress should be slow for a few years. Quality should be the prime consideration when providing assistance, to avoid any failures which might result from overlooked management details. The number of acres on which an employee will provide assistance during the planting season should be about one-half of the average rates estimated in "Workload Analysis." Time frame: Three to five years.

Phase III - If phase II is successful, the program will accelerate on its own. Field office personnel will not have enough time to service all requests. As the management skills among operators and field office personnel increase, less time will be needed per acre of conservation tillage installed in the county. Time frame: Eight to ten years.

Phase IV - Maintenance. If this program is enacted, it is not unrealistic to project 90 percent of all acres currently eroding above "T" would be in conservation tillage by the year 2000. These systems must be maintained. SCS will have to stay knowledgeable of current technology to deal with problems which may occur with extended use of conservation systems. This is necessary to avoid the return to conventional tillage.

Agencies and Programs

Programs to implement the proposed strategy will require involvement from federal, state, and local agencies, units of government, and private landowners. The ODNR Division of Soil and Water Conservation and the USDA Soil Conservation Service, in cooperation with local soil land water conservation districts, must assume the major responsibility for implementing the plan elements necessary to deal with the land treatment and erosion problems in the basin.

Federal Agencies

The principal U.S. Department of Agriculture agencies having responsibility for administering programs and providing services to promote conservation, development, and utilization of water and related land resources are the Soil Conservation Service, Cooperative Extension Service, Agricultural Stabilization and Conservation Service, and Farmers Home Administration. The U.S. Forest Service provides financial and technical assistance on forested lands.

Soil Conservation Service - The Soil Conservation Service (SCS) has authority from several legislative actions. Under PL 74-46, the SCS has a broad program of soil and water conservation and development. Their principal function is to assist landowners and operators in the planning of land use and the installation of land treatment measures. Under PL 83-566, the SCS provides technical and financial assistance to state and local organizations for watershed protection, flood prevention, fish and wildlife enhancement, public recreation, irrigation, and drainage. Loan assistance is also available for constructing municipal and industrial water supply reservoirs. To date, four watershed projects have been completed, one is in the process of being installed, and one has been approved for installation.

Resource Conservation and Development (RC&D) projects authorized under PL 87-703 are to assist conservation districts and local government or individuals to improve economic, environmental, or social conditions in their communities in multi-county areas. For accelerated conservation or land use change activities, SCS can provide technical and financial assistance to eligible sponsors. The basin contains two active RC&D projects.

Title IV, or Public Law 95-87, established funds and programs for the reclamation of abandoned mines. SCS is responsible for the Rural Abandoned Mine Program phase of the law. Under this program, SCS, through conservation districts, provides long-term federal technical and financial assistance to land users for the reclamation, conservation, and development of certain abandoned coal-mined lands. More specifically, the program's objectives are to (1) stabilize mined lands, (2) control erosion and sediment on mined areas and areas affected by mining, (3) reclaim lands and water for useful purposes, (4) enhance water quality or quantity where it has been disturbed by past coal mining practices, and (5) remove hazards to life and property caused by past mining.

In addition to these authorities, SCS provides information and data on soil, land use, and the magnitude of problems within a region. The SCS Soil Survey and Inventory and Monitoring Programs have historical and current data available upon request from state and local offices.

Cooperative Extension Service - The Cooperative Extension Service (CES) of the USDA Science and Education Administration is the education agency of USDA and the land grant universities. The Extension Service provides information relating to conservation programs and practices through their local office network or via specialists located at land grant universities.

Agricultural Stabilization and Conservation Service - The Agricultural Stabilization and Conservation Service (ASCS) administers production adjustment, resource protection, and farm income stabilization programs. Under authority of PL 74-76, ASCS provides cost-sharing for a wide variety of soil, water, forestry, and related conservation and/or pollution abatement

practices. ASCS also administers the Forest Incentive, PL 91-524, under which cost sharing is provided for forest practices; the Water Bank Act, PL 91-559, which applies to the management of wetlands; and PL 95-240 and PL 85-58 under which cost sharing can be provided for agriculture damages or losses caused by natural disasters.

Farmers Home Administration - This agency, under authority of PL 92-219, as amended, makes loans and grants to qualified recipients. Loans are available for farm ownership and operations, emergencies, recreational enterprises, and grazing associations. Loans are also available to small communities for water and waste disposal systems. In addition to financial aid, the Farmer's Home Administration provides technical and management assistance.

Forest Service - The Forest Service (FS) is divided into three principal branches: the National Forest System, State and Private Forestry, and Forest Research. All three of these are represented in the basin.

Under provisions of the Organic Administration Act of 1897 and PL 86-517, Congress established that the renewable surface resources of the National Forest (primarily outdoor recreation, forage, timber, water, and wildlife and fish habitat) shall be administered for multiple use and sustained yield. Within the framework of this legislation and dependent upon funds available, reforestation, timber stand improvement, forest fire, management, and a variety of other resource protection and management activities are implemented. In 1976, PL 85-233 reaffirmed the principles of multiple use and sustained yield. The new act provides directives for planning, guidelines for timber harvesting, provisions for public involvement, and other aspects of National Forest System management.

State and private forestry functions are conducted under PL 95-313. This arm of the Forest Service has responsibility for providing national leadership and technical and financial assistance to resource managers and operators of nonfederal forest lands.

The Forest and Rangeland Renewable Research Act, PL 95-307, provides a broad charter for research in forest and renewable resources. Work being conducted in the basin includes inventories and assessments of forest resources, surface mine reclamation, and forest watershed management research.

Other Federal Agencies - Various other federal agencies have authority under numerous acts to contribute to the conservation and development of the basin's resources. Some of these are:

1. Department of Army - Corps of Engineers
2. Department of Housing and Urban Development - Federal Emergency Management Agency
3. Department of Interior - Heritage Conservation and Recreation Service
4. Department of Interior - Fish and Wildlife Service
5. Department of Interior - Geological Survey
6. Environmental Protection Agency

State Agencies and Programs

The state of Ohio sponsors and administers several projects and programs influencing the development and use of water and related land resources.

Ohio Department of Natural Resources - The Ohio Department of Natural Resources (ODNR) was established in 1949 to bring together the various state agencies engaged in conservation of natural resources. The director is appointed by the governor and coordinates the activities of ten divisions, most of which are directly concerned with water. They are: Forestry, Geological Survey, Natural Areas and Preserves, Oil and Gas, Parks and Recreation, Reclamation, Soil and Water Conservation, Water, Watercraft, and Wildlife. The Division of Water conducts major water management and planning programs for water supply, flood control, dam inspection and design,

and stream management. It serves as the governor's agent to administer state relationships with the Soil Conservation Service and Corps of Engineers.

Soil and Water Conservation Districts - Soil and Water Conservation Districts are delineated by county boundaries and are organized under provisions passed by the state legislature to promote conservation, improvement, and development of water and land resources.

Each district is concerned with water, land, and associated resource problems. Their main objectives are to have complete soil and water conservation programs established on all lands. Districts enter into cooperative agreements with landowners or operators and provide assistance to those who wish to participate in district programs.

CHAPTER II

PROBLEMS, CONCERNS, AND PROJECTED CONDITIONS

The major problems and concerns related to the land and water resources of the Central Ohio River Basin are discussed in this chapter. A resource inventory conducted by the Soil Conservation Service[1/] identified many of the problems related to the availability, use, and development of the land and water resources. The public, including members of planning commissions, special interest groups, and state and federal agencies also provided information on a wide range of concerns and problems in the basin.

Most of the study concerns are interrelated but for the purposes of this report they have been categorized into four areas: (1) Land Use, (2) Erosion and Sedimentation, (3) Agricultural Drainage, and (4) Flooding. Table II.1 lists these concerns for the years 1979 and 2000. The estimates for the year 2000 are based primarily on a continuation of current activities but without the development or acceleration of existing water and related land resource programs and projects. Other areas of concern such as water supply, recreation, fish and wildlife, natural areas, or scenic rivers were not considered at the request of the Ohio Department of Natural Resources.

The identified problems and concerns were evaluated in terms of their potential impact upon economic growth, production efficiency, and general enhancement of the environment.

1/ See Appendix, page A-2, A-33-39.

Table II.1 - Present and Projected Problems & Concerns Evaluated For Years 1979 and 2000
Central Ohio River Basin

Item	Unit	Upper 1979	Upper 2000	Lower 1979	Lower 2000	Basin 1979	Basin 2000
Land Use and Production							
Cropland	Thous. ac.	2,398	2,431	484	512	2,882	2,943
Prime Farmland	Thous. ac.	2,161	--	221	--	2,382	--
Pastureland	Thous. ac.	210	184	452	438	662	622
Prime Farmland	Thous. ac.	131	--	73	--	204	--
Forest Land	Thous. ac.	402	363	1,775	1,749	2,177	2,112
Prime Farmland	Thous. ac.	135	--	43	--	178	--
Other Land	Thous. ac.	196	171	177 1/	172 1/	373 1/	343 1/
Prime Farmland	Thous. ac.	102	--	22	--	124	--
All Rural Land	Thous. ac.	3,206	3,149	2,888 1/	2,871 1/	6,094 1/	6,020 1/
Prime Farmland	Thous. ac.	2,530	--	358	--	2,888	--
Agricultural Production Major Crops	Thous. dol.	490,648	646,882	63,069	87,335	553,717	734,217
Forestry Production	Mil. cu. ft.	7.5	13.1	35.8	62.4	43.3	75.5

(Continued)

Table II.1 (Continued)

Item	Unit	Upper 1979	Upper 2000	Lower 1979	Lower 2000	Basin 1979	Basin 2000
Erosion and Sedimentation							
Sheet & Rill, Avg Annual Amt							
Cropland, Total	Thous. tons	10,503	6,279	2,335	2,533	12,838	8,813
Pastureland, Total	Thous. tons	210	140	1,636	966	1,846	1,106
Forest Land, Total	Thous. tons	704	560	4,331	3,610	5,035	4,170
Other Land, Total	Thous. tons	611	583	513	502	1,124	1,086
All Rural Land, Total	Thous. tons	12,028	7,562	8,815	7,611	20,843	15,175
Gully Average Annual Amount	Thous. ac.	--	--	80	65	80	65
	Thous. tons	--	--	18,153	14,721	18,153	14,721
Channel, Avg. Annual Amount	Thous. tons	358	358	828	828	1,186	1,186
Sediment, Avg. Annual Amount	Thous. tons	1,206	841	1,488	1,266	2,694	2,107

(Continued)

Table II.1 (Continued)

Item	Unit	Upper 1979	Upper 2000	Lower 1979	Lower 2000	Basin 1979	Basin 2000
Agricultural Drainage Needed on Cropland:							
Complete							
Drainage	Thous. ac.	894	446	25	21	919	467
Random Drainage	Thous. ac.	210	106	18	15	228	121
Outlet	Thous. ac.	106	86	--	--	107	86
Total	Thous. ac.	1,210	638	44	36	1,254	674
Flooding							
Cropland	Thous. ac.	101	102	99	104	200	206
Damages	Thous. dol.	2,833	3,710	4,379	5,588	7,212	9,298
Pastureland	Thous. ac.	15	13	42	41	57	54
Damages	Thous. dol.	37	41	84	106	121	147
Forest Land	Thous. ac.	32	29	51	45	83	74
Other Land	Thous. ac.	28	25	17	14	45	39
Total	Thous. ac.	176	169	209	205	385	373

Columns and/or rows may not add due to rounding.

1/ Includes about 70,000 acres of strip mines, quarries, and barren land which were deleted in the computation of sheet and rill erosion.

Land Use

Approximately 87 percent or 5.9 million acres in Central Ohio River Basin are classified as agricultural land, including forest land. Other land not in farms, including urban and built up areas, totals 848,000 acres and covers 12 percent of the land base. The remaining one percent is in farmsteads, quarries, pits, strip mines, and other rural land in farms. The total land area of the basin is 6.9 million acres (Table II.2).

As the population of the basin continues to grow, rural land is converted to urban land. This causes a loss in the agricultural land base. The acreage of agricultural land is expected to decline by about 75,000 acres between now and the year 2000. Most of the build up is expected to occur in the Columbus metropolitan area within the upper basin. There are about 3.7 million acres in the upper basin with 2.5 million acres of prime farmland. This land is high in fertility and has few soil conservation problems. It is the best suited land for agricultural production. If present trends continue, approximately 57,000 acres of this prime agricultural land will be converted to urban land by the year 2000.

In 1979, about 48 percent of the agricultural land, 2.9 million acres, was classified as cropland. Approximately 2.2 million acres, or about 37 percent, were identified as forest land. Pastureland of about 662,000 acres accounted for 11 percent and the remaining four percent was in farmsteads and other land in farms.

The majority of the forest land, 82 percent, is located in the southern half of the basin, which is unglaciated and includes 11 counties. The remaining 18 percent is in small, scattered tracts throughout the 12 glaciated counties.

Most of the basin's cropland, 83 percent, is located in the upper basin. The glacial soils of the upper basin are flatter and more productive than the soils in the unglaciated lower basin and are better suited for cropland.

Table II.2 - Present and Projected[1/] Land Use of Cropland, Pastureland, Forest Land, and Other Land For Years 1979 and 2000
Central Ohio River Basin

Item	Upper 1979	Upper 2000	Lower 1979	Lower 2000	Basin 1979	Basin 2000
	---	---	1,000 acres	---	---	---
Cropland						
Row Crops	1,869	1,802	204	207	2,072	2,009
Close-Grown Crops	271	286	15	22	287	308
Summer Fallow	3	--	(*)	--	3	--
Rotation Hay and Pasture	188	285	90	225	278	510
Hayland	36	--	123	--	159	--
Orchards, Vineyards, and Bush Fruit	5	40[2/]	2	16[2/]	7	56[2/]
Other Cropland	25	19	51	41	76	60
TOTAL	2,398	2,431	484	512	2,882	2,943
Pastureland	210	184	452	438	662	622
TOTAL	210	184	452	438	662	622
Forest Land						
Harvested Grazed	3	--	3	--	6	--
Harvested Ungrazed	15	--	43	--	58	--
Not Harvested Grazed	37	--	134	--	171	--
Not Harvested Ungrazed	348	--	1,594	--	1,942	--
TOTAL	402	363	1,775	1,749	2,177	2,112
Other Land						
Farmsteads	54	--	28	--	83	--
Other Land in Farms	88	--	43	--	131	--
Quarries, Pits, and Strip Mines	5	--	66	--	71	--
Other Land Not in Farms[3/]	519	--	329	--	848	--
TOTAL	667	697	466	478	1,133	1,175
GRAND TOTAL	3,677	3,675[4/]	3,177	3,177	6,854	6,852[4/]

Source: CORB Natural Resources Inventory.
(*) Less than 500 acres.
Columns and/or rows may not add due to rounding.

1/ Future without plan (accelerated conservation treatment without new water related programs or projects).

2/ Specialty crops and orchards, vineyards, and bush fruit.

3/ Includes urban and built up areas.

4/ 2,000 acres converted to water.

Pastureland is more evenly distributed throughout the basin than cropland or forest land. About 68 percent of the basin's pasture is in the lower basin.

The basin has about 1,133,000 acres classified as other land. Some of the land uses in this category are farmsteads, rural roads and rail-roads, idle land, barren land, urban land, and active and abandoned strip mines. A lot of the idle land is currently on the fringe of urban centers and being held for development.

Other conditions relative to the present and those expected to occur by the year 2000 will be discussed briefly along with the other major problems.

Cropland Production

Agriculture is one of the principal industries in the basin. Corn and soybeans are the crops with the highest value. Table II.3 shows the normal and projected acreage of the major crops in the basin. About 31 percent of the cropland, or 898,000 acres, is normally used to produce corn for grain and about 34 percent, or 971,000 acres, is normally used for soybeans.

Normal production of about 97 million bushels of corn grain is expected to increase to 133 million bushels by the year 2000 (Table II.4). Soybean production is also expected to increase substantially from a normal output of about 35 million bushels to 46 million bushels. These increases resulted primarily from four factors: (1) increase in cropland acreage, (2) increase in conservation tillage systems, (3) increase in acreage adequately drained, and (4) increase in per acre yields.

Table II.3 - Normal and Projected Acreage of Major Crops in the Lower and Upper Areas of Central Ohio River Basin For Years 1978 and 2000

Crop	Upper 1978	Upper 2000	Lower 1978	Lower 2000	Basin 1978	Basin 2000
	-----1,000 acres-----					
Corn, Grain	803	825	96	133	898	958
Corn, Silage	30	31	6	8	36	39
Soybeans	922	946	49	66	971	1,012
Wheat	291	286	22	22	313	308
Hay	110	108	107	106	217	215
Rotation Pasture	180	177	119	118	299	295
Specialty Crops	41	40	17	16	57	56

Source: Census of Agriculture, CORB Resources Inventory.

Table II.4 - Normal and Projected Output of Major Crops in the Lower and Upper Areas of Central Ohio River Basin For Years 1978 and 2000

Crop	Unit	Upper 1978	Upper 2000	Lower 1978	Lower 2000	Basin 1978	Basin 2000
		-----1,000-----					
Corn, Grain	Bu.	88,308	118,655	9,003	14,752	97,311	133,406
Corn, Silage	Tons	493	660	85	138	578	799
Soybeans	Bu.	33,354	43,937	1,428	2,240	34,782	46,178
Wheat	Bu.	12,665	15,758	683	796	13,348	16,554
Hay	Tons	413	529	325	377	738	906
Rotation Pasture	AUD	34,561	43,194	18,282	21,233	52,844	64,428

Source: Census of Agriculture, CORB Resources Inventory

Pastureland Production

The pasture in the basin is generally below its optimum production potential. There are 662,000 acres of pasture located in the basin. About one-third of it is in good condition with no treatment needs. Another one-third, or 215,000 acres, needs improvement through the addition of lime and fertilizer to maintain productivity. Approximately 106,000 acres are in need of brush control. Table II.5 gives pastureland conditions and treatment needs for the present and future conditions.

Forest Production

Forest land in the Central Ohio River Basin covers approximately 2,200,000 acres or about 32 percent of the land area. The forests are comprised of 33 percent sawtimber stands, 11 percent pole timber stands, 54 percent sapling and seedling stands, and 2 percent non-stocked forest area. The high percentage of sapling and seedling stands indicate that much harvesting has occurred during the past several decades, and that much forest land will be growing into mechantable sizes during the next 20 to 40 years.

The Oak-Hickory forest type comprises 61 percent of the forested area, with the Maple-Beech-Birch type next prevalent at 14 percent, and the Elm-Ash-Red Maple type covering 12 percent. Small areas of Oak-Pine type, 7 percent, and Pine type, 6 percent, are found in the southeastern counties of the basin.

Demand for wood for fuel increased by 770 percent on the Wayne National Forest between 1976 and 1980, illustrating an increased interest in alternative energy sources. Should heavy demand develop for energy wood, both problems and opportunities would present themselves to forest land owners and operators.

Annual forest production is expected to increase from 43.3 million cubic feet to 75.5 million cubic feet. This constitutes a 74 percent annual timber production increase by the year 2000.

Table II.5 - Present and Projected Pastureland Conditions For Years 1979 and 2000

Item	Upper 1979	Upper 2000	Lower 1979	Lower 2000	Basin 1979	Basin 2000
	-----	-----	-----1,000 acres-----	-----	-----	-----
Pastureland						
Treatment not needed	83	91	127	207	210	298
Treatment not feasible	8	7	7	7	16	14
Protection only	14	11	19	15	33	26
Improvement only	69	48	146	102	215	150
Brush control and improvement	23	16	83	58	106	74
Reestablishment only	11	9	46	36	57	45
Reestablishment and brush control	3	1	24	12	26	13
TOTAL	210	184	452	438	662	622

Columns and/or rows may not add due to rounding.

Source: CORB Resource Inventory

Erosion

Erosion and resulting sedimentation is a major limitation in the use and management of the land. The process of detachment and transportation of soil materials is accelerated by any activity which disturbs the protective surface cover. This accelerated erosion includes several types: sheet and rill, gully, streambank, roadside, floodplain scour, and developing urban areas.

Sheet and rill erosion on cropland is the most destructive type of erosion occurring throughout most of the basin and is a problem on many acres. Erosion is a major cause of soil degradation and a threat to the productivity of agriculture. The soils that are subject to erosion generally have six to eight inches of silt loam topsoil. Directly beneath the topsoil is the subsoil which is very high in clay content. As the topsoil erodes and clay subsoil is incorporated into the plow layer, the productivity of the land diminishes. The clay is less desirable because it has less available moisture, less fertility, and less ability to store and transmit nutrients. As the amount of clay increases in the plow layer, the soil requires more fertilizer and other inputs to produce crops making it more expensive to farm with smaller yields.

The acreage affected by gully erosion is slight but on-site and off-site impacts are quite significant. Gully erosion generally occurs in the southern part of the study area where the terrain is rolling to hilly and in many cases disturbed by surface mining.

Stream channel erosion results from high velocity water flow in areas of unstable soils. Recession of streambanks, slumping, scour, and down cutting of the streambed are characteristics of stream channel erosion. Problems from streambank erosion are very dramatic in appearance but are quite localized and slight on a wide scale. Floodplain scour is prevalent where out-of-bank flows occur, resulting in damage to cropland through removal of

surface soils and nutrients and resulting deposition on surrounding areas. This is a very localized problem with little impact on the total basin resources.

Lands being converted to urban and related build up may undergo excessive erosion if proper controls are not undertaken during the construction period.

Cropland Erosion

Cropland erosion occurs primarily on land with slopes greater than 2 percent. The soils of the basin have been grouped by land capabilty classes I through VII. Class I soils are those with few limitations that restrict their use. As the numerals increase, limitations are more restrictive as to the types of crops planted and generally more intensive conservation practices are needed. Classes I through IV soils are the ones most commonly cultivated. Classes V through VII are generally not suited to cropping because of major land use limitations and are best suited to pastureland, forest land or wildlife areas.

Table II.6 shows the present acreage of cropland and the average annual sheet and rill erosion rate by capability class and subclass. Erosion occurs to some extent on all cropland but the dominant portion is on soils having an erosion hazard subclass. It is on these sloping acreages where erosion is occurring at a rate exceeding tolerable levels. The soil resource base cannot be maintained at these erosion rates. Approximately one million acres, or 36 percent, of all cropland has a soil loss above tolerable levels (Table II.7).

The greatest cropland erosion problems occur in the upper basin. Of the one million acres eroding over tolerable levels, 891,000 acres, or 88 percent, are in the upper basin.

Table II.6 - Present Acreage of Cropland and Average Annual Sheet and Rill Erosion Rate by Land Capability Class and Subclass, Present Conditions
Central Ohio River Basin

Land Capability Class and Subclass1/	Upper		Lower		Basin	
	Acres	Erosion Rate2/	Acres	Erosion Rate2/	Acres	Erosion Rate2/
	1,000	T/A/Yr.	1,000	T/A/Yr.	100	T/A/Yr.
I	54	2.62 2/	58	2.05	112	2.32
IIe1/	637	5.92	137	4.75	774	5.71
IIw	1,340	2.55	65	2.60	1,405	2.56
IIs	26	2.22	(*)	1.00	26	2.18
IIIe	128	11.98	121	5.38	248	8.77
IIIw	151	2.38	16	2.23	167	2.36
IIIs	0	.00	0	.00	0	.00
IVe	39	16.42	57	7.58	96	11.17
IVw	2	.00	(*)	3.59	2	.70
IVs	0	.00	1	16.73	1	16.73
V	0	.00	0	.00	0	.00
VIe	16	16.66	21	10.49	37	13.19
VIs	1	31.84	6	7.71	7	10.82
VIIe	4	44.45	1	1.50	5	36.14
VIIs	0	.00	1	4.30	1	4.30
Total	2,398	4.34	484	4.83	2,882	4.42

Source: CORB Resource Inventory.
(*) Less than 500 acres.
Columns may not add due to rounding.

1/ Subclasses consist of the following hazards:
e = erosion; w = wetness; s = drouthiness or stoniness.

2/ Soil losses are averages for large acreages and do not imply the ability to measure soil loss to the nearest .01 ton.

Table II.7 - Acres of Cropland by Erosion Rates Rates in Tons/Acre/Year

Area	Tolerable		Exceed Tolerable		
	0-2	2- "T"	"T" -10	10-30	Over 30
	1,000 acres				
Upper	939	568	703	162	26
Lower	240	93	92	47	11
Basin	1,179	661	795	209	37

Source: CORB Erosion Inventory

Excessive erosion occurs on all capability classes above class I. It is caused by the widespread practices of intense row crop rotations, fall and spring plowing, and a general lack of conservation treatment. This widespread abuse of over one-third of all cropland in the basin represents a grave problem. If it continues unchecked, severe and permanent damage to the soil resource base will occur. Any solution of this problem will involve a major change in tillage practices.

Pastureland Erosion

Table II.8 shows the present acreage of pastureland, and the average annual sheet and rill erosion by land capability class and subclass.

Poor pasture management has resulted in erosion problems on some 135,000 acres, or 20 percent (Table II.9).

This land is currently eroding at rates exceeding tolerable levels. About 119,000 of these problem acres occur in the lower basin. Most problems occur on class IVe land and above where the soil on steep slopes have been abused by too intense grazing and lack of soil maintenance practices such as the addition of lime and fertilizer.

Table II.8 - Present Acreage of Pastureland and Average Annual Sheet and Rill Erosion Rate by Land Capability Class and Subclass, Present Conditions
Central Ohio River Basin

Land Capability Class and Subclass1/	Upper		Lower		Basin	
	Acres	Erosion Rate2/	Acres	Erosion Rate2/	Acres	Erosion Rate2/
	1,000	T/A/Yr.	1,000	T/A/Yr.	100	T/A/Yr.
I	4	.09	21	.20 2/	25	.18 2/
IIe	61	.54	49	.52	110	.53
IIw	66	.23	27	.27	93	.24
IIs	1	.34	0	.00	1	.34
IIIe	33	1.22	88	1.84	121	1.67
IIIw	7	.15	6	.18	13	.16
IIIs	0	.00	(*)	.06	(*)	.06
IVe	23	2.46	132	5.06	155	4.68
IVw	0	.00	0	.00	0	.00
IVs	0	.00	2	7.83	2	7.83
V	(*)	.01	0	.00	(*)	.01
VIe	12	4.29	96	6.39	108	6.17
VIs	(*)	2.16	6	2.80	7	2.76
VIIe	3	4.10	17	4.84	20	4.73
VIIs	(*)	1.88	6	5.84	6	5.54
Total	210	1.00	452	3.62	662	2.79

Source: CORB Resource Inventory.
(*) Less than 500 acres.
Columns may not add due to rounding.

1/ Subclasses consist of the following hazards:
e = erosion; w = wetness; s = drouthiness or stoniness.

2/ Soil losses are averages for large acreages and do not imply the ability to measure soil loss to the nearest .01 ton.

Table II.9 - Acres of Pasture and Forest Eroding at Rates Over Tolerable Levels

Area	Pasture		Forest	
	Under T	Over T	Under T	Over T
	1,000 acres			
Upper	194	16	356	46
Lower	333	119	1,450	325
Basin	527	135	1,806	371

Source: CORB Resource Inventory

Forest Land Erosion

Erosion is generally not a problem on properly managed and maintained forest land. The normal rate of erosion will depend on such parameters as rainfall, bedrock and soil type, and slope.

Approximately 177,000 acres of forest land are subject to livestock grazing. This reduces forest production and increases erosion. Grazing is the major cause of woodland erosion in the basin.

Tree cutting disturbs the forest environment. The amount of disturbance depends on the amount of activity. Skidding logs across the forest floor disturbs and disrupts litter and duff and exposes the soil to the erosion. Skidding logs up or down slopes may create grooves or channels in the forest floor which could lead to the formation of gullies.

Logging roads also create a potential erosion hazard which varies considerably depending on the location, construction, and maintenance of the roads. Research shows that logging roads are the greatest producer of sediment in streams from harvested forest areas. The road surface, steep cut and fill slopes, and cut banks are particularly susceptible to erosion.

Properly harvested woodland is not a serious source of erosion because of the number of years between operations. Erosion can be a problem when the harvested woodland is disturbed by other activities.

Erosion on land classes I-IV average less than one-half ton per acre per year (Table II.10). Most erosion problems occur on the steeper sloping land, land capability classes VI and VII, in both the upper and lower portion of the basin. Erosion is a problem on 371,000 acres of forest land (Table II.9).

<u>Other Rural Lands and Critically Eroding Areas</u>

Other lands include land in strip mines, borrow pits, idle areas, farmsteads and miscellaneous land areas.

The highest erosion in the study area occurs on abandoned strip mine lands in the lower basin. Erosion rates in these areas exceed 100 tons per acre per year. They are highly gullied and practically devoid of vegetation. About 8,500 acres in the lower basin are subject to this enormous erosion problem. Soil erosion from this land exceeds 18 million tons annually.

Locally significant but relatively minor erosion problems can be present on farmsteads, roadsides, and idle land.

Table II.10 - Present Acreage of Forest Land and Average Annual Sheet and Rill Erosion Rate of Land Capability Class and Subclass, Present Conditions
Central Ohio River Basin

Land Capability Class and Subclass1/	Upper		Lower		Basin	
	Acres	Erosion Rate2/	Acres	Erosion Rate2/	Acres	Erosion Rate2/
	1,000	T/A/Yr.	1,000	T/A/Yr.	100	T/A/Yr.
I	5	.05	12	.18	17	.14
IIe	41	.41	28	.22	69	.33
IIw	99	.13	32	.18	131	.14
IIs	2	.07	(*)	.01	2	.06
IIIe	41	.87	165	.75	206	.77
IIIw	12	.09	9	.20	21	.14
IIIs	0	.00	(*)	.16	(*)	.16
IVe	39	1.57	361	1.81	400	1.79
IVw	0	.00	0	.00	0	.00
IVs	0	.00	3	3.90	3	3.90
V	(*)	.03	0	.00	(*)	.03
VIe	52	2.42	570	3.21	622	3.12
VIs	2	7.97	27	2.65	28	2.94
VIIe	52	3.28	444	3.58	496	3.55
VIIs	57	4.62	123	1.85	181	2.73
Total	402	1.75	1,775	2.44	2,177	2.31

Source: CORB Erosion Inventory.
(*) Less than 500 acres.
Columns may not add due to rounding.

1/ Subclasses consist of the following hazards:
e = erosion; w = wetness; s = drouthiness or stoniness.

2/ Soil losses are averages for large acreages and do not imply the ability to measure soil loss to the nearest .01 ton.

Sedimentation

The erosional cycle consists of soil erosion, transportation (which is sometimes called delivery), and deposition. In a strictly natural system these components usually change very slowly. When man disrupts one or more of the components, a rapid physical change occurs to the system and sedimentation rates increase. Examples of man's impact on erosion include farming, logging, surface mining, and construction. Man's impacts on the sediment transportation system include channel work, bridge construction, stream impoundments, and levees. Changes to the depositional system can include new channel development, reservoir construction, bridge development or any other restriction of the floodway, levees, or any feature which causes sediment to be deposited or removed.

Stream sampling and gauging data have been collected and compiled by the U.S. Geological Survey (USGS) for the state of Ohio. These data reflect only suspended sediment discharges at respective locations. It is estimated that the average annual suspended sediment discharge from the upper basin is 1.2 million tons/years and 1.5 million tons/year from the lower basin. The discharge into the Ohio River is an estimated 2.7 million tons annually from the composite total basin. These figures do not reflect bedload discharge.

Critically eroding areas (gullies) in the lower basin contribute a tremendous amount of bedload to the stream system. Sediment from those areas outside the critically eroding gullied areas comes mostly from sheet erosion which moves the finer silts and clays into the delivery system as a suspended load. Figure II.1 shows a map representation of suspended sediment yields in the basin.

CENTRAL OHIO RIVER BASIN

SUSPENDED SEDIMENT YIELD

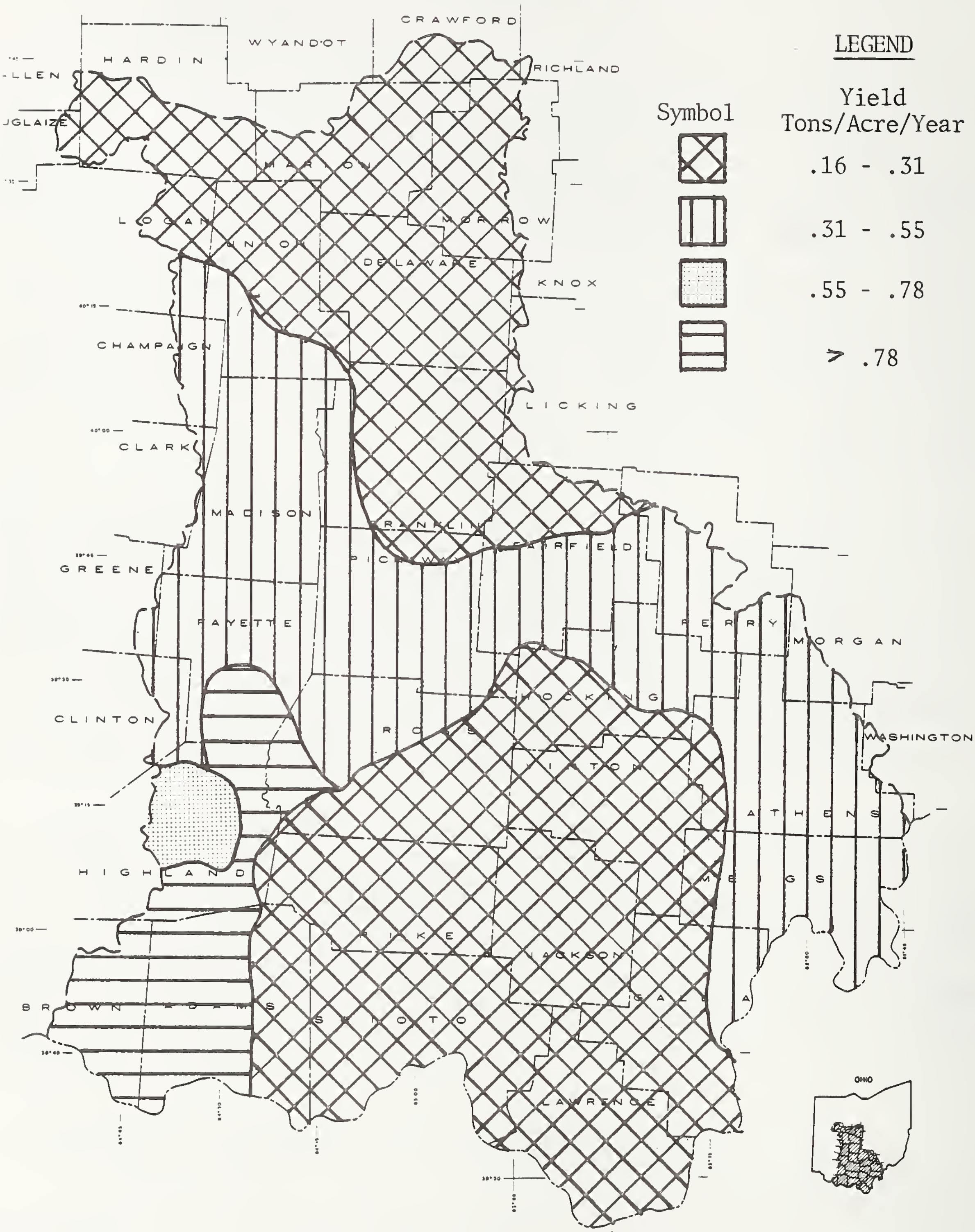


Figure II.1

Source: U.S.G.S. Fluvial Sediment in Ohio
Water Supply Paper 2045

Agricultural Drainage

The basin has about two million acres of wet soils. This hazard is caused by soil factors such as slow permeability in the substratum and topography. This wetness condition delays land preparation, planting and harvesting, and retards plant growth. This increases production costs and reduces yields.

About 1.2 million acres of cropland in the basin is in need of artificial drainage. The drainage needs have been classified into three catagories: (1) complete drainage needed, (2) random drainage needed, and (3) outlet needed. Approximately 919,000 acres, or 73 percent, of the wet soil needing treatment would require a complete drainage system (Table II.11). About 18 percent would require only random drainage and some 9 percent of the wet soils would need an outlet.

Table II.11 - Present and Projected Conservation Treatment Needed for Cropland on Wet Soils by Land Capability Class and Subclass for Years 1979 and 2000
Central Ohio River Basin

Item	Upper 1979	Upper 2000	Lower 1979	Lower 2000	Basin 1979	Basin 2000
	-----------------------1,000 acres					-----------------------
IIw						
Complete drainage needed	732	372	15	11	746	383
Random drainage needed	114	67	7	5	121	72
Outlet needed	68	68	(*)	--	69	68
Total	914	507	22	16	936	523
IIIw						
Complete drainage needed	65	20	8	8	74	29
Random drainage needed	17	7	1	2	18	9
Outlet needed	22	13	0	--	22	13
Total	104	41	9	10	113	51
IVw						
Complete drainage needed	0	--	0	--	0	--
Random drainage needed	(*)	--	0	--	(*)	--
Outlet needed	0	--	0	--	0	--
Total	(*)	--	0	--	(*)	--
Other Classes						
Complete drainage needed	97	54	2	1	99	56
Random drainage needed	79	32	11	8	89	40
Outlet needed	16	5	0	-	16	5
Total	192	91	13	9	205	100
All Classes						
Complete drainage needed	894	446	25	21	919	467
Random drainage needed	210	106	18	15	228	121
Outlet needed	106	86	(*)	--	107	86
Total	1,210	638	44	36	1,254	674

Source: CORB Natural Resource Inventory.

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

Flooding

One of the problems in the study area is flooding of agricultural land. Many of the major flood hazards in the Central Ohio River Basin have been reduced by dams, dikes, and levees.

Slightly over 200,000 acres of cropland in the basin is subject to flooding (Table II.12). This area includes some 101,000 acres in the upper basin and 99,000 acres in the lower basin. Major widespread flooding in the basin occurs more frequently during the winter and spring months. During these months, runoff is accelerated by snow melt and frozen ground conditions. Ice jams at bridges and culverts also aggrevate upstream flooding. High intensity rains during the cropping season tend to be more localized and generally flood fewer acres.

Floodwater damages to cropland and pastureland result in delayed plantings, plant injuries, weed infestations, additional tillage operations, delayed harvest, and increased production costs. Annual cropland and pastureland flood damages average about $7.4 million.

Damage to bottomland forests during flood periods is minimal, as flood waters generally do not stay high for long enough periods. Flooding within the basin can be locally significant. It is not a major widespread problem and was not addressed in the basin planning process.

Table II.12 - Cropland Flood-Prone Areas by Land Capability Class and Subclass for Years 1979 and 2000 Total Annual Damages for Cropland and Pastureland
Central Ohio River Basin

Land Capability Class and Subclass	Upper 1979	Upper 2000	Lower 1979	Lower 2000	Basin 1979	Basin 2000
	----------	----------	----------	1,000 acres	----------	----------
I	17	17	44	46	61	63
IIe	5	5	2	2	7	7
IIw	57	58	46	49	103	106
IIs	5	5	(*)	(*)	6	6
IIIe	1	1	1	1	2	2
IIIw	15	15	6	6	20	21
VIIe	1	1	0	0	1	1
Total	101	102	99	104	200	206
Damages in Thousand Dollars:						
Cropland	2,833	3,710	4,379	5,588	7,212	9,298
Pastureland	37	41	84	106	121	147

Source: CORB Natural Resources Inventory.

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

CHAPTER III
ALTERNATIVE PLANS

Alternative plans for the development and use of the land and water resources of the Central Ohio River Basin are discussed in this chapter. Four alternative plans were formulated to reflect the problems and concerns of the public and also to be responsive to national economic development and environmental quality objectives. All of the plans were structured to evaluate the impacts of various levels of agricultural tillage and management practices for the year 2000.

In Table III.1 the four alternative plans selected are briefly described. Alternative #1 (W/O) is the future without plan and is an estimate of projected conditions in the year 2000 assuming accelerated conservation treatment and on-going programs and projects but without any new or expanded programs. This alternative is also the benchmark against which the impacts of the other alternatives selected are measured. Alternative #2 (OBERS) represents a set of projections prepared by U.S. Department of Commerce and the U.S. Department of Agriculture and published by the Water Resources Council. OBERS projections are available for state and substate areas and are consistent with national projections. Alternative #3 (NED) emphasizes national economic development by increasing the value of the nation's output of goods and services and improving national economic efficiency. Alternative #4 (EQ) enhances the environmental quality by the management, conservation, preservation, and improvement of the natural and cultural resources and ecological systems.

Table III.1 - Alternative Plans -- Year 2000, Central Ohio River Basin

Alternatives	
#1 (W/O)	Indicates potential future conditions assuming accelerated conservation treatment but without new water and related land programs or projects.
#2 (OBERS)	Indicates potential future conditions assuming the continuation of on-going programs and projects.
#3 (NED)	Emphasizes national economic development by increasing food and fiber output to increase income.
#4 (EQ)	Enhances environmental quality by reducing the sheet and rill erosion to soil loss tolerance ("T" value).

Assumptions and projections were made for each alternative plan concerning the land use, agricultural inputs, crop yields, and conservation treatment for the year 2000. Tables III.2 and III.3 list the assumptions made by alternatives.

Table III.2 - Central Ohio River Basin Future Conditions Assumptions, Upper Area in Year 2000

Item	Future Without Project	OBERS	National Economic Development	Environmental Quality
Population	Official state projections	Official state projections	Official state projections	Official state projections
Water Area	Present Plus: City of Columbus water supply reservoirs, Rush Creek PL-566 structures and CO farm ponds.	Present Plus: City of Columbus water supply reservoirs, Rush Creek PL-566 structures and CO farm ponds.	Present Plus: City of Columbus water supply reservoirs, Rush Creek PL-566 structures and CO farm ponds.	Present Plus: City of Columbus water supply reservoirs, Rush Creek PL-566 structures and CO farm ponds.
Urban Area	Present Plus: .25 acres per capita times population increase.	Present Plus: .25 acres per capita times population increase.	Present Plus: .25 acres per capita times population increase.	Present Plus: .25 acres per capita times population increase.
Cropland	Present Minus: Proportionate loss to urban; Plus acres classified as high potential cropland. Net increase will be about 1.5%	Present Minus: Proportionate loss to urban land; Plus acres classified as high potential cropland. Net increase will be about 1.5%.	Present Minus: Proportionate loss to urban land; Plus acres classified as high and medium potential cropland. Net increase will be about 8%.	Present Minus: Proportionate loss to urban land.
Pastureland	Present Minus: Proportionate loss to urban, and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban land.
Forest Land	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban land.
Other Land	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban land.

(Continued)

Table III.2 (Continued)

Item	Future Without Project	OBERS	National Economic Development	Environmental Quality
Drainage Needs (Random and complete systems)	50% of acres converted to adequate condition.	Present: No change.	70% of acres converted to adequate condition.	Present: No change.
Drainage Needs (Outlet and complete systems)	20% of acres converted to adequate condition.	Present: No change.	40% of acres converted to adequate condition.	Present: No change.
Conservation Practices (Adequately treated and erosion control needed)	Conservation tillage will be practiced on 70% row crop acres. 25% of this acreage will be no-till; 75% will be chisel disc. Acreage of contour farming and fall versus spring till ratios will remain the same.	Present: No change.	Conservation tillage will be practiced on 70% of row crop acres; 25% of this acreage will be no-till and 75% will be chisel disc. Acreage of contour farming and fall versus spring till ratios will remain the same.	Conservation tillage will be practiced on 90% of row crop acres; 40% of this acreage will be no-till and 60% will be chisel disc. Acreage of contour farming and fall versus spring till ratios will remain the same.
Crop Rotations	Acreage of continuous row crops will increase by the change in cropland acres. Acreage of the other crop rotations will continue at the present levels.	Acreage of continuous row crops will increase by the change in cropland acres. Acreage of the other crop rotations will continue at the present levels.	Acreage of continuous row crops will increase by the change in cropland acres. Acreage of the other crop rotations will continue at the present levels.	All crop rotations must be within T-value. Acreage of continuous row crops and small grain will decrease. Rotations with several years of hay or pasture will increase over present levels.
Crop Yields	Present Plus: 1.5% per year or approximately 30% increase.	Present Plus: .5% per year or approximately 10% increase.	Present Plus: 1.75% per year or approximately 35% increase.	Present Plus: .75% per year or approximately 15% increase.
Cropland Use	Corn and soybean acreages will increase by the change in the cropland acres. Wheat, hay, rotation pasture and specialty crop acreages will remain about the same.	Corn and soybean acreages will increase by the change in the cropland acres. Wheat, hay, rotation pasture and specialty crop acreages will remain about the same.	Corn and soybean acreages will increase by the change in the cropland acres. Wheat, hay, rotation pasture and specialty crop acreages will remain about the same.	Corn, soybean and wheat acreages will decrease in proportion to the change in crop rotations. Hay and pasture areages will increase.

Table III.3 - Central Ohio River Basin Future Conditions Assumptions, Lower Area in Year 2000

Item	Future Without Project	OBERS	National Economic Development	Environmental Quality
Population	Official state projections.	Official state projection	Official state projections	Official state projections
Water Area	Present Plus: Rush Creek PL-566 structures and CO farm ponds.	Present Plus: Rush Creek PL-566 structures and CO farm ponds.	Present Plus: Rush Creek PL-566 structures and CO farm ponds.	Present Plus: Rush Creek PL-566 structures and CO farm ponds.
Urban Area	Present Plus: .25 acres per capita times population increase.	Present Plus: .25 acres per capita times population increase.	Present Plus: .25 acres per capita times population increase.	Present Plus: .25 acres per capita times population increase.
Cropland	Present Minus: Proportionate loss to urban land; Plus 1/3 of acres classified as high potential cropland. Net increase will be about 5.5%.	Present Minus: Proportion loss to urban land; Plus 1/3 of acres classified as high potential cropland. Net increase will be about 5.5%.	Present Minus: Proportionate loss to urban land; Plus total classified as high and 1/4 of medium potential cropland. Net increase will be about 25%.	Present Acreage Minus: Proportionate loss to urban land.
Pastureland	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban land.
Forest Land	Present Minus: Proportionate loss to urban land and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban land.
Other Land	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban and proportionate loss to cropland.	Present Minus: Proportionate loss to urban land.

(Continued)

Table III.3 (Continued)

Item	Future Without Project	OBERS	National Economic Development	Environmental Quality
Drainage Needs (Random and complete systems)	20% of acres converted to adequate conditions.	Present: No change.	40% of acres converted to adequate condition.	Present: No change.
Conservation Practices (Adequately treated and erosion control needed)	Conservation tillage will be practiced on 70% of row crop acres; 35% of this acreage will be no-till and 65% will be chisel disc. Acreage of contour farming and fall versus spring till ratios will remain the same.	Present: No change.	Conservation tillage will be practiced on 70% of row crop acres; 35% of this acreage will be no-till and 65% will be chisel disc. Acreage of contour farming and fall versus spring till ratios will remain the same.	Conservation tillage will be practiced on 90% of row crop acres; 50% of this acreage will be no-till and 50% will be chisel disc. Acreage of contour farming and fall versus spring till ratios will remain the same.
Crop Rotation	Acreage of continuous row crops will increase by the change in cropland acres. Acreage of the other crop rotations will continue at the present levels.	Acreage of continuous row crops will increase by the change in cropland acres. Acreage of the other crop rotations will continue at the present levels.	Acreage of continuous row crop will increase by the change in cropland acres. Acreage of the other crop rotations will continue at the present levels.	All crop rotations must be within T-value. Acreage of continuous row crops and small grain will decrease. Rotations with several years of hay or pasture will increase over present levels.
Crop Yields	Present Plus: 1.5% per year or approximately 30% increase.	Present Plus: .5% per year or approximately 10% increase.	Present Plus: 1.75% per year or approximately 35% increase.	Present Plus: .75% per year or approximately 15% increase.
Cropland Use	Corn and soybean acreages will increase by the change in the cropland acres. Wheat, hay, rotation pasture and specialty crop acreages will remain about the same.	Corn and soybean acreages will increase by the change in the cropland acres. Wheat, hay, rotation pasture and specialty crop acreages will remain about the same.	Corn and soybean acreages will increased by the change in the cropland acres. Wheat, hay, rotation pasture and specialty crop acreages will remain about the same.	Corn, soybean and wheat acreages will decrease in proportion to the change in crop acres. Hay and pasture acreages will increase.

A computer model was used to help project land use patterns, affects on erosion, and production potential under the alternative sets of assumptions. Inputs generated for the model included combining soils with similar characteristics and productive potential into Soil Resource Groups (SRGs), developing crop rotations representing the area, projecting yield increases under various rotations and tillage methods, developing soil loss information for rotations and tillage practices for each SRG, and budgets for crops used in the analysis.

Yield differentials were estimated for several treatment needs under numerous combinations of crop rotations and tillage practices. The "e" soils generally show a yield response to conservation tillage versus conventional tillage. Since "e" soils are on slopes, wetness is usually not a problem but droughtiness and soil loss are. Conservation tillage keeps more soil in place and reduces droughtiness thus increasing yields. The "w" soils not having adequate drainage generally have lower yields under no-till than under conventional tillage. These soils tend to warm and drain more slowly in the spring due to the organic material and growth left on the surface under no-till.

Alternative #1 (W/O)

The Future Without Plan is an estimate of future conditions in the year 2000, which probably will exist if no federal or federally-assisted water resources projects and programs, other than those already authorized and funded, are carried out. Alternative #1 (W/O) also serves as the base against which selected variables of alternative plans are compared and evaluated (Table III.4a and 4b).

Assumptions

A basic assumption underlying the yield projections is that the rapid rate of increase that occurred from 1947-78 will continue through the period 1979-2000 resulting in an annual increase of 1.5 percent, or a total increase of approximately 30 percent. Conservation tillage will be practiced on 70 percent of the row crop acreage, with about 30 percent of this acreage in no-till and 70 percent in chisel disc. In addition, about 50 percent of the cropland needing drainage will be treated.

Elements

Plan elements shown in Table III 4a include the following:

1. Conservation tillage systems will be installed on 1.9 million acres.

2. Drainage systems will be installed on 1.2 million acres.

3. Forest land growing stock will be improved on 113,000 acres of forest land.

4. Conservation treatment will be installed on 103,000 acres of pastureland.

Effects

Conservation treatment and needed management measures will be applied to 1,747,000 acres of cropland resulting in 59 percent of the land being considered adequately treated. The acreage of cropland needing erosion control will be about 14 percent, or 405,000 acres. Random and complete drainage will be needed on about 674,000 cropland acres.

Some 298,000 acres of pastureland will be adequately treated, while 324,000 acres will still need to be improved. Forest land treatment will be applied to 113,000 acres. Forest land soil erosion will be reduced 17 percent.

The acreage of rural land exceeding soil loss tolerance will be 1.1 million acres, or 18 percent, of the area subject to erosion. Some 590,000 acres of cropland will be in excess of the tolerable limits. Gully erosion is expected to occur on some 65,000 acres and contribute significantly to the sediment problem in the basin. Most of this area is on unprotected strip mined land. Channel bank erosion, including floodplain scour, will affect about 250 miles of streams.

Application of conservation tillage practices will reduce the sheet and rill erosion on rural lands to about 2.5 tons per acre, some 26 percent below the current level. About 1,500 acres of critically eroding strip mined land will be stabilized, thus reducing gully erosion by 19 percent. Sediment yield from all lands is estimated to be about 2.1 million tons, or 22 percent, less than the 1979 estimate.

The value of major agricultural crops was projected to be nearly $735 million by the year 2000, with estimated production costs of some $457 million. The quantity of fuel use represents a slight decrease from the current level of about 9 percent, due to the increased use of conservation tillage practices on cropland. Projected usage of fertilizer represents a 40 percent increase over 1979 levels.

Table III.4a - Summary of Plan Elements for Alternative #1 (W/O) Without New Water and Related Land Programs and Projects - Year 2000
Central Ohio River Basin

Element	Upper	Lower	Basin
	--------------	1,000 acres	-----------
Erosion and Sedimentation			
No-till, tillage	412	79	491
Chisel disc, tillage	1,221	165	1,386
Contour farming, spring plow	21	88	110
Contour farming, fall plow	13	14	28
Conventional tillage, spring plow	279	87	365
Conventional tillage, fall plow	426	21	447
Agricultural Drainage			
Completely drained	1,039	56	1,095
Randomly drained	106	4	110
Drained with outlet	21	0	21
Forest Land Treatment1/			
Protection from grazing	4	21	25
Planting	1	5	6
Timberstand improvement	14	68	82
Pastureland Treatment1/			
Protection	1	3	4
Improvement	12	39	51
Brush control	4	22	26
Reestablishment	1	8	9
Reestablishment and brush control	1	11	12

Columns and/or rows may not add due to rounding.

1/ Net changes from the base year, 1979.

Table III.4b - Alternative #1 (W/O) Without New Water and Related Land Programs and Projects - Year 2000 - Effects
Central Ohio River Basin

Item	Unit	Upper	Lower	Basin
Conservation Treatment				
Cropland	Thous. ac.	2,431	512	2,943
Adequately treated	Thous. ac.	1,460	287	1,747
No-till	Thous. ac.	387	50	437
Chisel disc	Thous. ac.	711	95	806
Contour	Thous. ac.	35	103	138
Conventional	Thous. ac.	327	40	367
Permanent cover	Thous. ac.	--	--	--
Erosion control needed	Thous. ac.	275	131	405
No-till	Thous. ac.	24	29	54
Chisel disc	Thous. ac.	86	46	132
Conventional	Thous. ac.	164	55	219
Random drainage needed	Thous. ac.	106	15	121
Chisel disc	Thous. ac.	70	10	80
Conventional	Thous. ac.	36	5	41
Complete drainage needed	Thous. ac.	446	21	467
Chisel disc	Thous. ac.	297	14	311
Conventional	Thous. ac.	150	7	156
Outlet needed	Thous. ac.	86	--	86
Chisel disc	Thous. ac.	57	--	57
Conventional	Thous. ac.	29	--	29
Unallocated	Thous. ac.	59	58	117
Pastureland	Thous. ac.	184	438	622
Treatment adequate	Thous. ac.	91	207	298
Treatment needed	Thous. ac.	93	231	324
Forest Land	Thous. ac.	363	1,749	2,112
Grazed	Thous. ac.	35	117	152
Not-grazed	Thous. ac.	328	1,632	1,960
Estab. reinforce stand	Thous. ac.	14	84	98
Improve timber stand	Thous. ac.	221	851	1,073
Land Exceeding Soil Loss Tolerance				
Cropland	Thous. ac.	420	171	590
Pastureland	Thous. ac.	4	102	106
Forest land	Thous. ac.	27	231	258
Other land	Thous. ac.	25	106	132
Total	Thous. ac.	476	610	1,086
Critical Area Stabilization				
Gully & strip mines	Thous. ac.	--	65	65
Channel	Miles	75	175	250

(Continued)

Table III.4b (Continued)

Item	Unit	Upper	Lower	Basin
Erosion (Sheet & Rill)				
Cropland	Thous. tons	6,279	2,533	8,813
Pastureland	Thous. tons	140	966	1,106
Forest land	Thous. tons	560	3,610	4,170
Other land	Thous. tons	583	502	1,086
Total	Thous. tons	7,562	7,611	15,175
Erosion (Critical Areas)				
Gully includes strip mine	Thous. tons	--	14,721	14,721
Channel	Thous. tons	358	828	1,186
Sediment yield	Thous. tons	841	1,266	2,107
Value of Major Agricultural Crops	Thous. dol.	646,882	87,335	734,217
Production Costs of Major Agricultural Crops	Thous. dol.	395,311	61,449	456,761
Net Effects Agricultural Crops	Thous. dol.	251,571	25,886	277,456
Value of Forest Products	Thous. dol.	190,000	907,500	1,097,500
Conservation Treatment				
Installation	Thous. dol.	230	2,070	2,300
Technical assistance	Thous. dol.	4,000	268	4,269
Forest products	Thous. dol.	71,400	7,200	78,600
Agricultural Inputs				
Fuel	Thous. gal.	25,081	4,761	29,842
Herbicides	Thous. dol.	31,124	3,433	34,557
Pesticides	Thous. dol.	3,759	580	4,339
Fertilizer				
Nitrogen	Thous. tons	98	15	114
Phosphorus	Thous. tons	68	11	79
Potassium	Thous. tons	106	24	130
Employment				
Major agricultural crops	Man/Year	3,637	725	4,362
Forest products	Man/Year	16,150	1,950	18,100
Technical assistance	Man/Year	577	142	719

Columns and/or rows may not add due to rounding.

Alternative #2 (OBERS)

Alternative #2 (OBERS) was developed from a set of projections published by the Water Resources Council for use in resource development planning for state and substate areas. The projections of future conditions generally assume a continuation of on-going programs and projects (Table III.5a and 5b).

Assumptions

Crop yields will increase at a slower rate than occurred during the past 30 years, averaging about .5 percent per year for a total increase of about 10 percent. The acreage of cropland in conservation tillage and the amount of land needing drainage will remain at about the 1979 level. The acreage of cropland needing conservation treatment will be about 2.0 million acres.

Elements

Plan elements shown on Table III.5a include the following:

1. Conservation tillage systems will be installed on 283,000 acres.

2. Agricultural drainage at present levels.

3. Forest land growing stock will be improved on 113,000 acres.

4. Conservation treatment will be installed on 103,000 acres of pastureland.

Table III.5a - Summary of Plan Elements for Alternative #2 (OBERS)
Continuation of Historical Trends - Year 2000
Central Ohio River Basin

Element	Upper	Lower	Basin
	-----------1,000 acres-----------		
Erosion and Sedimentation			
No till, tillage	13	23	36
Chisel disc, tillage	221	26	247
Contour farming, spring plow	22	92	114
Contour farming, fall plow	13	15	28
Conventional tillage, spring plow	833	241	1,074
Conventional tillage, fall plow	1,271	57	1,328
Agricultural Drainage			
Completely drained	593	50	643
Randomly drained	0	0	0
Drained with outlet	0	0	0
Forest Land Treatment1/			
Protection from grazing	4	21	25
Planting	1	5	6
Timberstand improvement	14	68	82
Pastureland Treatment1/			
Protection	1	3	4
Improvement	12	39	51
Brush control	4	22	26
Reestablishment	1	8	9
Reestablishment and brush control	1	11	12

Columns and/or rows may not add due to rounding.

1/ Net changes from the base year, 1979.

Table III.5b - Alternative #2 (OBERS) Continuation of Historical Trends - Year 2000 - Effects
Central Ohio River Basin

Item	Unit	Upper	Lower	Basin
Conservation Treatment				
Cropland	Thous. ac.	2,431	512	2,943
Adequately treated	Thous. ac.	664	258	922
No till	Thous. ac.	12	18	30
Chisel disc	Thous. ac.	215	22	237
Contour	Thous. ac.	35	107	142
Conventional	Thous. ac.	402	110	513
Permanent cover	Thous. ac.	--	--	--
Erosion control needed	Thous. ac.	497	151	648
No till	Thous. ac.	1	5	6
Chisel disc	Thous. ac.	6	4	10
Conventional	Thous. ac.	489	143	632
Random drainage needed	Thous. ac.	212	19	231
Chisel disc	Thous. ac.	--	--	--
Conventional	Thous. ac.	212	19	231
Complete drainage needed	Thous. ac.	893	26	919
Chisel disc	Thous. ac.	--	--	--
Conventional	Thous. ac.	893	26	919
Outlet needed	Thous. ac.	107	--	107
Chisel disc	Thous. ac.	--	--	--
Conventional	Thous. ac.	107	--	107
Unallocated	Thous. ac.	59	58	117
Pastureland	Thous. ac.	184	438	622
Treatment adequate	Thous. ac.	91	207	298
Treatment needed	Thous. ac.	93	231	324
Forest Land	Thous. ac.	363	1,749	2,112
Grazed	Thous. ac.	35	117	152
Not-grazed	Thous. ac.	328	1,632	1,960
Estab. reinforce stand	Thous. ac.	14	84	98
Improve timber stand	Thous. ac.	221	851	1,073
Land Exceeding Soil Loss Tolerance				
Cropland	Thous. ac.	865	197	1,062
Pastureland	Thous. ac.	4	102	106
Forest land	Thous. ac.	27	231	258
Other land	Thous. ac.	25	106	132
Total	Thous. ac.	921	636	1,558
Critical Area Stabilization				
Gully & strip mines	Thous. ac.	--	65	65
Channel	Miles	75	175	250

(Continued)

Table III.5b (Continued)

Item	Unit	Upper	Lower	Basin
Erosion (Sheet & Rill)				
Cropland	Thous. tons	10,942	3,401	14,343
Pastureland	Thous. tons	140	966	1,106
Forest land	Thous. tons	560	3,610	4,170
Other land	Thous. tons	583	502	1,086
Total	Thous. tons	12,225	8,479	20,705
Erosion (Critical Areas)				
Gully includes strip mine	Thous. tons	--	14,721	14,721
Channel	Thous. tons	358	828	1,186
Sediment Yield	Thous. tons	958	1,303	2,261
Value of Major Agricultural Crops	Thous. dol.	550,429	80,684	631,113
Production Costs of Major Agricultural Crops	Thous. dol.	349,839	58,993	408,831
Net Effects Agricultural Crops	Thous. dol.	200,590	21,691	222,281
Value of Forest Products	Thous. dol.	190,000	907,500	1,097,500
Conservation Treatment				
Installation	Thous. dol.	230	2,070	2,300
Technical assistance	Thous. dol.	853	212	1,065
Forest products	Thous. dol.	71,400	7,200	78,600
Agricultural Inputs				
Fuel	Thous. gal.	29,283	5,108	34,392
Herbicides	Thous. dol.	25,184	2,749	27,933
Pesticides	Thous. dol.	2,113	387	2,500
Fertilizer				
Nitrogen	Thous. tons	72	13	85
Phosphorus	Thous. tons	58	10	68
Potassium	Thous. tons	90	23	113
Employment				
Major agricultural crops	Man/Year	4,138	774	4,912
Forest products	Man/Year	16,150	1,950	18,100
Technical assistance	Man/Year	34	8	42

Columns and/or rows may not add due to rounding.

Effects

The effects of the (OBERS) alternative are listed on Table III.5b. The amount of rural land eroding at higher than tolerable rates was projected at 1.6 million acres, or about 26 percent, of the land base. Most of the sheet and rill erosion would occur on one million acres of cropland. Critical area stabilization was projected to be needed on 65,000 acres of land with gullies.

The value of major agricultural crops was estimated at $631 million. Production costs were projected to be $409 million. The projected fuel use was 34 million gallons and the fertilizer use was 266,000 tons. The estimated employment required in the production of the major agricultural crops was 4,912 man/years.

The OBERS projection predicts approximately $103 million less net average annual agricultural production than alternative No. 1, Future Without. This alternative predicts 5.5 million tons per year more soil loss than alternate No. 1 with no change in critical area soil loss. See Tables III.8b, 9b, and 10b for a comparison of all alternatives.

Alternative #3 (NED)

This alternative is directed toward increasing the value of the nation's output of goods and services over the future without condition. The economic development alternative emphasizes an acceleration of existing programs and agricultural activities which permit greater utilization of the land base and production factors (Tables III.6a and 6b).

Assumptions

Yield increases are expected to average about 1.75 percent per year, or about 35 percent, for the period 1979-2000. Some 70 percent of the cropland needing drainage will be converted to an adequate condition, and outlets will be provided for about 40 percent of the cropland needing this practice. Conservation tillage will be practiced on 70 percent of the row crop acreage with about 30 percent of this acreage in no-till and 70 percent in chisel disc.

Elements

The elements for (NED) Plan are listed on Table III.6a and include the following:

1. Conservation tillage systems will be installed on 2.1 million acres.

2. Agricultural drainage will be installed on 1.5 million acres.

3. Forest land growing stock will be improved on 106,000 acres.

4. Conservation treatment will be installed on 164,000 acres of pastureland.

Table III.6a - Summary of Plan Elements for Alternative #3 (NED) National Economic Development - Year 2000
Central Ohio River Basin

Element	Upper	Lower	Basin
	-----------	1,000 acres	-----------
Erosion and Sedimentation			
No till, tillage	438	107	546
Chisel disc, tillage	1,308	222	1,529
Contour farming, spring plow	21	89	110
Contour farming, fall plow	13	14	28
Conventional tillage, spring plow	300	116	416
Conventional tillage, fall plow	454	27	481
Agricultural Drainage			
Completely drained	1,252	63	1,315
Randomly drained	159	9	168
Drained with outlet	45	0	45
Forest Land Treatment1/			
Protection from grazing	3	20	23
Planting	1	5	6
Timberstand improvement	11	65	77
Pastureland Treatment1/			
Protection	3	15	18
Improvement	18	50	68
Brush control	7	36	43
Reestablishment	4	20	23
Reestablishment and brush control	1	10	11

Columns and/or rows may not add due to rounding.

1/ Net changes from the base year, 1979.

Table III.6b - Alternative #3 (NED) National Economic Development - Year 2000 - Effects
Central Ohio River Basin

Item	Unit	Upper	Lower	Basin
Conservation Treatment				
Cropland	Thous. ac.	2,593	638	3,231
Adequately treated	Thous. ac.	1,814	319	2,133
No till	Thous. ac.	410	57	467
Chisel disc	Thous. ac.	939	112	1,051
Contour	Thous. ac.	35	103	138
Conventional	Thous. ac.	430	47	476
Permanent cover	Thous. ac.	--	--	--
Erosion control needed	Thous. ac.	302	222	524
No till	Thous. ac.	28	50	78
Chisel disc	Thous. ac.	90	87	177
Conventional	Thous. ac.	184	85	269
Random drainage needed	Thous. ac.	68	14	82
Chisel disc	Thous. ac.	45	9	55
Conventional	Thous. ac.	23	5	27
Complete drainage needed	Thous. ac.	282	19	302
Chisel disc	Thous. ac.	188	13	201
Conventional	Thous. ac.	94	6	101
Outlet needed	Thous. ac.	68	--	68
Chisel disc	Thous. ac.	45	--	45
Conventional	Thous. ac.	23	--	23
Unallocated	Thous. ac.	59	64	123
Pastureland	Thous. ac.	136	391	527
Treatment adequate	Thous. ac.	53	282	335
Treatment needed	Thous. ac.	83	109	192
Forest Land	Thous. ac.	293	1,687	1,980
Grazed	Thous. ac.	29	114	143
Not-grazed	Thous. ac.	264	1,573	1,837
Estab. reinforce stand	Thous. ac.	11	81	93
Improve timber stand	Thous. ac.	182	822	1,004
Land Exceeding Soil Loss Tolerance				
Cropland	Thous. ac.	481	268	748
Pastureland	Thous. ac.	0	72	72
Forest land	Thous. ac.	31	235	266
Other land	Thous. ac.	23	103	126
Total	Thous. ac.	535	678	1,212
Critical Area Stabilization				
Gully & strip mines	Thous. ac.	--	65	65
Channel	Miles	75	175	250

(Continued)

Table III.6b (Continued)

Item	Unit	Upper	Lower	Basin
Erosion (Sheet & Rill)				
Cropland	Thous. tons	6,997	4,451	11,448
Pastureland	Thous. tons	68	764	832
Forest land	Thous. tons	592	3,636	4,228
Other land	Thous. tons	548	470	1,018
Total	Thous. tons	8,205	9,321	17,526
Erosion (Critical Areas)				
Gully includes strip mine	Thous. tons	--	14,721	14,721
Channel	Thous. tons	358	828	1,186
Sediment Yield	Thous. tons	961	1,348	2,309
Value of Major Agricultural Crops	Thous. dol.	727,626	115,342	842,968
Production Costs of Major Agricultural Crops	Thous. dol.	443,213	80,795	524,008
Net Effects Agricultural Crops	Thous. dol.	284,413	34,547	318,959
Value of Forest Products	Thous. dol.	172,500	997,500	1,170,000
Conservation Treatment				
Installation	Thous. dol.	522	1,368	1,890
Technical assistance	Thous. dol.	4,790	156	4,946
Forest products	Thous. dol.	67,000	16,900	83,900
Agricultural Inputs				
Fuel	Thous. gal.	26,840	6,220	33,059
Herbicides	Thous. dol.	34,313	5,521	39,834
Pesticides	Thous. dol.	4,112	948	5,060
Fertilizer				
Nitrogen	Thous. tons	112	19	131
Phosphorus	Thous. tons	76	13	89
Potassium	Thous. tons	116	27	143
Employment				
Major agricultural crops	Man/Year	3,888	946	4,834
Forest products	Man/Year	17,220	2,080	19,300
Technical assistance	Man/Year	189	6	195

Columns and/or rows may not add due to rounding.

Effects

The effects of the (NED) alternative are listed on Table III.6b. The projections of land use and type of agriculture expected in the year 2000 for the economic development alternative are essentially the same as the without plan conditions. The major difference between the two plans is the increase in cropland adequately treated, the level of agricultural inputs, and the quantity of crops produced.

The projected acreage of cropland adequately treated will be 2.1 million acres, or about 66 percent, of the total cropland. This represents an increase of 385,000 acres over the projected without plan. The cropland needing complete and random drainage will decrease about 33 percent from 674,000 acres to 452,000 acres.

The acres of pastureland and forest land would decrease by 95,000 and 132,000, respectively, over the without plan. The acres of pastureland adequately treated would increase by 37,000 acres. The acres of grazed forest land would decrease by 9,000 acres.

The acreage of rural land exceeding the soil loss tolerance would be 1.2 million acres, or 12 percent, more than expected in the without plan, with cropland accounting for 62 percent of the total. The stabilization of critical areas would be accelerated with the initiation of new projects to alleviate the water and related land resource problems.

The value of major agricultural crops would amount to $843 million, an increase of 15 percent. Production costs also increased from 15 percent over the without plan to $524 million. The net increase is approximately $42 million in farm income to the basin. This increased production represents 472 man/years of additional farm employment, an increase of 11 percent from the without plan.

Agricultural inputs would also increase over the without plan by approximately 13 percent. Fuel requirements would increase 11 percent, chemicals by 15 percent, and fertilizers by 12 percent.

Sheet and rill erosion from cropland would increase by about 30 percent over the projected without situation. Erosion on pastureland and forest land would decrease by about 4 percent.

Alternative No. 3 predicts approximately $109 million more net average annual production than Alternate No. 1, Future Without. The value of forest products increased by $72.5 million. This alternative predicts 2.4 million tons per year more soil loss than the future without with no change in critical area soil loss. See Tables III.8b, 9b, and 10b for a comparison of all alternatives.

Alternative #4 (EQ)

Alternative #4 (EQ) emphasizes the protection and enhancement of the environment. This alternative provides for an acceleration of the application of land treatment practices and the reduction of erosion and related natural resource problems (Tables III.7a and 7b).

Assumptions

Needed conservation tillage will be applied on some 90 percent of the row crop acreage, with about 45 percent of this acreage in no-till and about 55 percent in chisel disc. An assumption was also made that the acreage of cropland needing drainage would remain unchanged. Yield increases are expected to average about .75 percent per year, or about a 15 percent increase, for the period 1979-2000.

Projected land use for the environmental quality alternative is similar to that for the previous alternatives except that all crop rotations are within "T" value. This objective resulted in the conversion to permanent cover of 106,000 acres of cropland which were susceptible to erosion.

All cropland needing erosion control was shifted to conservation tillage. This resulted in all cropland being adequately treated. The acreage of cropland needing random and complete drainage as well as outlets is 1.2 million acres, about the same as 1979 level.

Elements

EQ plan elements listed on Table II.7a include the following:

1. Conservation tillage systems are installed on 2.2 million acres of cropland.

2. Agricultural drainage is left at present levels.

3. Forest land growing stock will improve on 1,500 acres.

4. Conservation tretment will be installed on 127,000 acres of pastureland.

Table III.7a - Summary of Plan Elements for Alternative #4 (EQ)
Environmental Quality - Year 2000
Central Ohio River Basin

Element	Upper	Lower	Basin
	-----------1,000 acres-----------		
Erosion and Sedimentation			
No till, tillage	822	110	932
Chisel disc, tillage	1,145	127	1,272
Contour farming, spring plow	22	92	114
Contour farming, fall plow	13	15	28
Conventional tillage, spring plow	97	23	120
Conventional tillage, fall plow	146	5	151
Agricultural Drainage			
Completely drained	593	50	643
Randomly drained	0	0	0
Drained with outlet	0	0	0
Forest Land Treatment 1/			
Protection from grazing	5	21	26
Planting	1	5	6
Timberstand improvement	15	68	84
Pastureland Treatment 1/			
Protection	6	7	13
Improvement	27	58	85
Brush control	0	0	0
Reestablishment	5	23	28
Reestablishment and brush control	0	0	0

Columns and/or rows may not add due to rounding.

1/ Net changes from the base year, 1979.

Table III.7b - Alternative #4 (EQ) Environmental Quality - Year 2000 - Effects, Central Ohio River Basin

Item	Unit	Upper	Lower	Basin
Conservation Treatment				
Cropland	Thous. ac.	2,355	481	2,836
Adequately treated	Thous. ac.	1,125	362	1,487
No till	Thous. ac.	450	110	560
Chisel disc	Thous. ac.	511	98	609
Contour	Thous. ac.	35	107	142
Conventional	Thous. ac.	79	23	101
Permanent cover	Thous. ac.	50	24	74
Erosion control needed	Thous. ac.	--	--	--
No till	Thous. ac.	--	--	--
Chisel disc	Thous. ac.	--	--	--
Conventional	Thous. ac.	--	--	--
Random drainage needed	Thous. ac.	203	15	218
No till	Thous. ac.	58	--	58
Chisel disc	Thous. ac.	120	13	133
Conventional	Thous. ac.	25	2	27
Complete drainage needed	Thous. ac.	863	19	882
No till	Thous. ac.	314	--	314
Chisel disc	Thous. ac.	424	16	440
Conventional	Thous. ac.	125	3	128
Outlet needed	Thous. ac.	104	--	104
Chisel disc	Thous. ac.	90	--	90
Conventional	Thous. ac.	14	--	14
Unallocated	Thous. ac.	61	85	146
Pastureland	Thous. ac.	207	449	656
Treatment adequate	Thous. ac.	119	214	333
Treatment needed	Thous. ac.	88	236	323
Forest Land	Thous. ac.	395	1,764	2,159
Grazed	Thous. ac.	38	118	156
Not-grazed	Thous. ac.	357	1,646	2,003
Estab. reinforce stand	Thous. ac.	15	85	100
Improve timber stand	Thous. ac.	240	858	1,098
Land Exceeding Soil Loss Tolerance				
Cropland	Thous. ac.	40	43	83
Pastureland	Thous. ac.	0	95	95
Forest land	Thous. ac.	25	231	256
Other land	Thous. ac.	27	107	134
Total	Thous. ac.	92	476	568
Critical Area Stabilization				
Gully & strip mines	Thous. ac.	--	65	65
Channel	Miles	75	175	250

(Continued)

Table III.7b (Continued)

Item	Unit	Upper	Lower	Basin
Erosion (Sheet & Rill)				
Cropland	Thous. tons	3,326	1,240	4,566
Pastureland	Thous. tons	80	939	1,019
Forest land	Thous. tons	538	3,610	4,148
Other land	Thous. tons	600	510	1,110
Total	Thous. tons	4,544	6,299	10,843
Erosion (Critical Areas)				
Gully includes strip mine	Thous. tons	--	14,721	14,721
Channel	Thous. tons	358	828	1,186
Sediment Yield	Thous. tons	547	1,229	1,776
Value of Major Agricultural Crops	Thous. dol.	565,194	70,464	635,658
Production Costs of Major Agricultural Crops	Thous. dol.	338,310	49,165	387,475
Net Effects Agricultural Crops	Thous. dol.	226,885	21,299	248,184
Value of Forest Products	Thous. dol.	185,000	887,500	1,072,500
Conservation Treatment				
Installation	Thous. dol.	627	2,440	3,067
Technical assistance	Thous. dol.	3,005	764	3,769
Forest products	Thous. dol.	69,000	7,100	76,100
Agricultural Inputs				
Fuel	Thous. gal.	22,705	3,697	26,402
Herbicides	Thous. dol.	30,627	2,126	32,753
Pesticides	Thous. dol.	4,721	424	5,145
Fertilizer				
Nitrogen	Thous. tons	81	13	95
Phosphorus	Thous. tons	60	9	69
Potassium	Thous. tons	93	22	116
Employment				
Major agricultural crops	Man/Year	3,353	564	3,917
Forest products	Man/Year	15,790	1,910	17,700
Technical assistance	Man/Year	117	26	143

Columns and/or rows may not add due to rounding.

Effects

The EQ Plan effects are listed in detail on Table III.7b. Some additional improvement in the management of the pastureland, forest land, and other agricultural land will result in the reduction of critical eroding areas and sediment production.

The estimated value of major agricultural crops is $636 million, some 13 percent less than the without plan situation. Projected costs for producing the crops were $387 million, resulting in a net income of $249 million, 11 percent less than Alternative #1.

Agricultural inputs were also projected to decrease, with fuel usage being 26 million gallons, a decline of 12 percent. The amount of chemicals used was 3 percent less than the projected without plan alternative. Fertilizers applied also declined by 13 percent. Some 3,917 man/years are needed to produce the projected agricultural output, about 10 percent less than the without plan.

Sheet and rill erosion would be reduced to 9.7 million tons annually. This would mean an average annual reduction of 1.7 tons per acre for all agricultural land uses. This reduction is 4.4 million tons less than Alternative #1 and also places all cropland within the acceptable soil loss tolerance. See Tables III.8b, 9b, and 10b for a comparison of all alternatives.

Comparison of Alternatives

In order to facilitate the comparison of the four alternatives for the year 2000, a set of three tables has been prepared. Tables III.8a and 8b provide a summary of the plan elements and land use for the upper basin; Tables III.9a and 9b provide the same information for the lower basin. The totals for the basin are shown in Tables III.10a and 10b. Alternative #1 (W/O)

shows the projected level of development or activity for the future without conditions, previously discussed in conjunction with Table III.4b. The other alternatives are shown either as (+) or (-) to indicate the magnitude of change from Alternative #1 (W/O).

Cropland

The amount of cropland varies by alternative. The OBERS contains the same acreage as W/O. Cropland acreages are increased by 10 percent in the NED and decreased 4 percent in the EQ. The EQ has the least cropland erosion with no acres over "T". The NED and OBERS have more erosion than the W/O. The NED has the greatest amount of artificial drainage installed. Drainage in the W/O is also at high levels. OBERS and EQ drainage levels are similiar to current levels.

The NED Plan produces the greatest value of major agricultural crops, about 15 percent higher, than the W/O. The OBERS and the EQ produce crops valued about 15 percent lower than the W/O.

Forest Land

The EQ has the greatest forest land acreage with 2 percent more acres than the W/O. The NED has about 6 percent less forest acres than the W/O; however, the highest levels of forest land management give the NED the highest value of forest products.

Pastureland

The highest acreage of pastureland is in the EQ plan, due to land use shifts out of cropland. Pasture conditions are better in both NED and EQ over the W/O. EQ pasture will have more brushy areas due to improved wildlife habitat.

Preferred Alternative

A preferred plan was not selected or developed from the alternative plans or combination of alternative plans. However, detailed examination and comparison of the plan elements and effects among the alternatives was made. The results of this effort led to the determination that several plan elements had similar beneficial effects. They increased productive capacity, conserved the resource base (reduced erosion), and improved economic efficiency for many of the erosive soils throughout the basin. These plan elements were resource management systems that included conservation tillage (reduced and no-till) and agricultural drainage.

For implementation purposes, it was determined that the primary strategy should be to assist farmers in the basin with the conversion to conservation tillage in order to solve erosion problems and improve production efficiency. Consequently, the strategies were developed and presented on a county-by-county basis, within the context of the overall basin, in Chapter I of this report.

Table III.8a - Summary of Plan Elements by Alternatives for Upper Area - Year 2000
Central Ohio River Basin

	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
	--------	--------	1,000 acres	--------	--------
Erosion and Sedimentation					
No till, tillage	13	412	- 399	+ 26	+ 410
Chisel disc, tillage	217	1,221	- 1,000	+ 87	- 76
Contour farming, spring plow	22	21	+ (*)	+ 0	+ (*)
Contour farming, fall plow	14	13	+ (*)	+ 0	+ (*)
Conventional tillage, spring plow	817	279	+ 554	+ 21	- 182
Conventional tillage, fall plow	1,254	426	+ 845	+ 27	- 280
Agricultural Drainage					
Completely drained	604	1,039	- 446	+ 213	- 446
Randomly drained	0	106	- 106	+ 53	- 106
Drained with outlet	0	21	- 21	+ 24	- 21
Forest Land Treatment					
Protection from grazing	--	4	0	- 1	+ (*)
Planting	--	1	0	- (*)	+ (*)
Timberstand improvement	--	14	0	- 3	+ 1
Pastureland Treatment					
Protection	--	1	0	+ 2	+ 4
Improvement	--	12	0	+ 6	+ 15
Brush control	--	4	0	+ 3	- 4
Reestablishment	--	1	0	+ 3	+ 5
Reestablishment & brush control	--	1	0	- (*)	- 1

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

Table III.8b - Summary of Plan Effects and Land Use by Alternative - Year 2000 Upper Area - Effects
Central Ohio River Basin

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Conservation Treatment						
Cropland	Thous. ac.	2,398	2,431	0	+ 162	- 76
Adequately treated	Thous. ac.	658	1,460	- 796	+ 354	- 335
No till	Thous. ac.	12	387	- 375	+ 23	+ 62
Chisel disc	Thous. ac.	211	711	- 496	+ 228	- 199
Contour	Thous. ac.	36	35	+ (*)	0	+ (*)
Conventional	Thous. ac.	400	327	+ 75	+ 103	- 248
Permanent cover	Thous. ac.	--	--	--	--	+ 50
Erosion Control Needed	Thous. ac.	477	275	+ 222	+ 27	- 275
No till	Thous. ac.	1	24	- 23	+ 4	- 24
Chisel disc	Thous. ac.	6	86	- 80	+ 4	- 86
Conventional	Thous. ac.	471	164	+ 325	+ 20	- 164
Random Drainage Needed	Thous. ac.	209	106	+ 106	- 38	+ 97
No till	Thous. ac.	--	--	--	--	+ 58
Chisel disc	Thous. ac.	--	70	- 70	- 25	+ 50
Conventional	Thous. ac.	209	36	+ 176	- 13	- 11
Complete Drainage Needed	Thous. ac.	886	446	+ 446	- 164	+ 417
No till	Thous. ac.	--	--	--	--	+ 314
Chisel disc	Thous. ac.	--	297	- 297	- 109	+ 127
Conventional	Thous. ac.	886	150	+ 743	- 55	- 25
Outlet Needed	Thous. ac.	106	86	+ 21	- 17	+ 18
Chisel disc	Thous. ac.	--	57	- 57	- 12	+ 33
Conventional	Thous. ac.	106	29	+ 78	- 6	- 14
Unallocated	Thous. ac.	62	59	0	+ (*)	+ 2
Pastureland	Thous. ac.	210	184	0	- 48	+ 23
Treatment adequate	Thous. ac.	83	91	0	- 38	+ 28
Treatment needed	Thous. ac.	128	93	0	- 10	- 5

(Continued)

Table III.8b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Forest Land	Thous. ac.	402	363	0	- 69	+ 32
Grazed	Thous. ac.	39	35	0	- 6	+ 3
Not-grazed	Thous. ac.	363	328	0	- 63	+ 30
Estab. reinforce stand	Thous. ac.	15	14	0	- 2	+ 1
Improve timber stand	Thous. ac.	236	221	0	+ 40	+ 19
Land Exceeding Soil Loss Tolerance						
Cropland	Thous. ac.	831	420	+ 445	+ 61	- 380
Pastureland	Thous. ac.	16	4	0	- 4	- 4
Forest land	Thous. ac.	46	27	0	+ 4	- 2
Other land	Thous. ac.	27	25	0	- 2	+ 2
Total	Thous. ac.	920	476	+ 445	+ 59	- 384
Critical Area Stabilization						
Gully & strip mines	Thous. ac.	--	--	--	--	--
Channel	Miles	75	75	0	0	0
Erosion (Sheet & Rill)						
Cropland	Thous. tons	10,503	6,279	+ 4,663	+ 718	- 2,953
Pastureland	Thous. tons	210	140	0	- 72	- 60
Forest land	Thous. tons	704	560	0	+ 32	- 22
Other land	Thous. tons	611	583	0	- 35	+ 17
Total	Thous. tons	12,028	7,562	+ 4,663	+ 643	- 3,018
Erosion (Critical Areas)						
Gully includes strip mine	Thous. tons	--	--	--	--	--
Channel	Thous. tons	358	358	0	0	0

(Continued)

Table III.8b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Sediment Yield	Thous. tons	1,206	841	+ 466	+ 120	- 294
Value of Major Agricultural Crops	Thous. dol.	490,648	646,882	- 96,453	+ 80,744	- 81,688
Production Costs of Major Agricultural Crops	Thous. dol.	328,111	395,311	- 45,473	+ 47,902	- 57,002
Net Effects						
Agricultural crops	Thous. dol.	162,537	251,571	- 50,980	+ 32,842	- 24,686
Value of Forest Products	Thous. dol.	118,200	190,000	0	- 17,500	- 5,000
Conservation Treatment						
Installation	Thous. dol.	--	230	0	+ 292	+ 397
Technical assistance	Thous. dol.	--	4,000	- 3,147	+ 790	- 995
Forest products	Thous. dol.	--	71,400	0	+ 4,400	- 2,400
Agricultural Inputs						
Fuel	Thous. gal.	28,535	25,081	+ 4,202	+ 1,759	- 2,376
Herbicides	Thous. dol.	24,534	31,124	- 5,940	+ 3,189	- 497
Pesticides	Thous. dol.	2,057	3,759	- 1,646	+ 353	+ 962
Fertilizer						
Nitrogen	Thous. tons	58	98	- 26	+ 13	- 17
Phosphorus	Thous. tons	52	68	- 10	+ 8	- 8
Potassium	Thous. tons	81	106	- 16	+ 10	- 13

(Continued)

Table III.8b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Employment						
Major agricultural crops	Man/Year	4,038	3,637	+ 501	+ 251	- 284
Forest products	Man/Year	9,560	16,150	0	+ 1,070	- 359
Technical assistance	Man/Year		577	- 543	- 388	- 460

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

Table III.9a - Summary of Plan Elements by Alternatives for Lower Area - Year 2000
Central Ohio River Basin

	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
	-----	-----	1,000 acres	-----	-----
Erosion and Sedimentation					
No till, tillage	19	79	- 56	+ 29	+ 31
Chisel disc, tillage	25	165	- 139	+ 57	- 38
Contour farming, spring plow	93	88	+ 4	+ (*)	+ 4
Contour farming, fall plow	15	14	+ (*)	+ (*)	+ (*)
Conventional tillage, spring plow	200	87	+ 154	+ 29	- 63
Conventional tillage, fall plow	46	21	+ 36	+ 6	- 16
Agricultural Drainage					
Completely drained	51	56	- 5	+ 8	- 5
Randomly drained	--	4	- 4	+ 6	- 4
Drained with outlet	--	0	0	0	0
Forest Land Treatment					
Protection from grazing	--	21	0	- 1	+ (*)
Planting	--	5	0	- (*)	+ (*)
Timberstand improvement	--	68	0	- 2	+ 1
Pastureland Treatment					
Protection	--	3	0	+ 12	+ 4
Improvement	--	39	0	+ 11	+ 19
Brush control	--	22	0	+ 14	- 22
Reestablishment	--	8	0	+ 12	+ 15
Reestablishment & brush control	--	11	0	- 1	- 11

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

Table III.9b - Summary of Plan Effects and Land Use by Alternative - Year 2000 Lower Area - Effects
Central Ohio River Basin

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Conservation Treatment						
Cropland	Thous. ac.	484	512	0	+ 127	- 30
Adequately treated	Thous. ac.	251	287	- 30	+ 32	+ 74
No till	Thous. ac.	17	50	- 31	+ 8	+ 60
Chisel disc	Thous. ac.	22	95	- 73	+ 18	+ 3
Contour	Thous. ac.	108	103	+ 4	+ (*)	+ 4
Conventional	Thous. ac.	105	40	+ 70	+ 6	- 17
Permanent cover	Thous. ac.	--	--	--	--	+ 24
Erosion Control Needed	Thous. ac.	113	131	+ 21	+ 91	- 131
No till	Thous. ac.	3	29	- 25	+ 21	- 29
Chisel disc	Thous. ac.	3	46	- 42	+ 41	- 46
Conventional	Thous. ac.	107	55	+ 88	+ 30	- 55
Random Drainage Needed	Thous. ac.	16	15	+ 4	- 1	+ (*)
No till	Thous. ac.	--	--	--	--	--
Chisel disc	Thous. ac.	--	10	- 10	- (*)	+ 3
Conventional	Thous. ac.	16	5	+ 14	- (*)	- 3
Complete Drainage Needed	Thous. ac.	19	21	+ 5	- 1	- 2
No till	Thous. ac.	--	--	--	--	--
Chisel disc	Thous. ac.	--	14	- 14	- 1	+ 2
Conventional	Thous. ac.	19	7	+ 19	- 1	- 4
Outlet Needed	Thous. ac.	--	--	--	--	--
Chisel disc	Thous. ac.	--	--	--	- --	--
Conventional	Thous. ac.	--	--	--	--	--
Unallocated	Thous. ac.	85	58	0	+ 6	+ 27
Pastureland	Thous. ac.	452	438	0	- 47	+ 11
Treatment adequate	Thous. ac.	127	207	0	+ 75	+ 6
Treatment needed	Thous. ac.	325	231	0	- 122	+ 5

(Continued)

Table III.9b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Forest Land	Thous. ac.	1,775	1,749	0	- 62	+ 15
Grazed	Thous. ac.	138	117	0	- 3	+ 1
Not-grazed	Thous. ac.	1,637	1,632	0	- 59	+ 14
Estab. reinforce stand	Thous. ac.	89	84	0	3	+ 1
Improve timber stand	Thous. ac.	919	851	0	29	+ 7
Land Exceeding Soil Loss Tolerance						
Cropland	Thous. ac.	158	171	+ 26	+ 97	- 128
Pastureland	Thous. ac.	119	102	0	- 30	- 7
Forest land	Thous. ac.	325	231	0	+ 4	0
Other land	Thous. ac.	108	106	0	- 3	+ 1
Total	Thous. ac.	710	610	+ 26	+ 68	- 134
Critical Area Stabilization						
Gully & strip mines	Thous. ac.	80	65	0	0	0
Channel	Miles	175	175	0	0	0
Erosion (Sheet & Rill)						
Cropland	Thous. tons	2,335	2,533	+ 868	+ 1,918	- 1,293
Pastureland	Thous. tons	1,636	966	0	- 202	- 27
Forest land	Thous. tons	4,331	3,610	0	+ 26	0
Other land	Thous. tons	513	502	0	- 32	+ 8
Total	Thous. tons	8,815	7,611	+ 868	+ 1,710	- 1,312
Erosion (Critical Areas)						
Gully includes strip mine	Thous. tons	18,153	14,721	0	0	0
Channel	Thous. tons	828	828	0	0	0

(Continued)

Table III.9b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Sediment Yield	Thous. tons	1,488	1,266	+ 37	+ 82	- 37
Value of Major Agricultural Crops	Thous. dol.	63,069	87,335	- 6,651	+ 28,007	- 16,871
Production Costs of Major Agricultural Crops	Thous. dol.	48,284	61,449	- 2,457	+ 19,346	- 12,284
Net Effects						
Agricultural crops	Thous. dol.	14,785	25,886	- 4,195	+ 8,661	- 4,587
Value of Forest Products	Thous. dol.	521,800	907,500	0	+ 90,000	- 20,000
Conservation Treatment						
Installation	Thous. dol.	--	2,070	0	- 702	- 369
Technical assistance	Thous. dol.	--	268	- 56	- 113	- 495
Forest products	Thous. dol.	--	7,200	0	+ 9,700	- 100
Agricultural Inputs						
Fuel	Thous. gal.	4,256	4,761	+ 348	+ 1,459	- 1,063
Herbicides	Thous. dol.	2,011	3,433	- 684	+ 2,088	- 1,307
Pesticides	Thous. dol.	278	580	- 194	+ 367	- 156
Fertilizer						
Nitrogen	Thous. tons	10	15	- 2	+ 4	- 2
Phosphorus	Thous. tons	8	11	- 1	+ 3	- 1
Potassium	Thous. tons	20	24	- 2	+ 3	- 2

(Continued)

Table III.9b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Employment						
Major agricultural crops	Man/Year	647	725	+ 49	+ 221	- 161
Forest products	Man/Year	--	1,950	0	+ 130	- 40
Technical assistance	Man/Year	--	142	- 134	- 136	- 116

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

Table III.10a - Summary of Plan Elements by Alternatives for Total Basin - Year 2000
Central Ohio River Basin

	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
	----------	----------	-1,000 acres-	----------	----------
Erosion and Sedimentation					
No till, tillage	32	491	- 455	+ 55	+ 441
Chisel disc, tillage	242	1,386	- 1,139	+ 143	- 113
Contour farming, spring plow	115	110	+ 4	+ (*)	+ 4
Contour farming, fall plow	28	28	+ (*)	+ (*)	+ (*)
Conventional tillage, spring plow	1,017	365	+ 708	+ 51	- 246
Conventional tillage, fall plow	1,300	447	+ 881	+ 34	- 296
Agricultural Drainage					
Completely drained	654	1,095	- 452	+ 220	- 452
Randomly drained	0	110	- 110	+ 58	- 110
Drained with outlet	0	21	- 21	+ 24	- 21
Forest Land Treatment					
Protection from grazing	--	25	0	- 2	+ 1
Planting	--	6	0	- (*)	+ (*)
Timberstand improvement	--	82	0	- 5	+ 2
Pastureland Treatment					
Protection	--	4	0	+ 14	+ 9
Improvement	--	51	0	+ 17	+ 34
Brush control	--	26	0	+ 17	- 26
Reestablishment	--	9	0	+ 15	+ 20
Reestablishment & brush control	--	12	0	- 1	- 12

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

Table III.10b - Summary of Plan Effects and Land Use by Alternatives Total Basin - Year 2000 - Effects
Central Ohio River Basin

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Conservation Treatment						
Cropland	Thous. ac.	2,882	2,943	0	+ 289	- 106
Adequately treated	Thous. ac.	910	1,747	- 826	+ 385	- 261
No till	Thous. ac.	29	437	- 407	+ 30	+ 123
Chisel disc	Thous. ac.	233	806	- 569	+ 246	- 196
Contour	Thous. ac.	143	138	+ 4	+ (*)	+ 4
Conventional	Thous. ac.	505	367	+ 146	+ 109	- 266
Permanent cover	Thous. ac.	--	--	--	--	+ 74
Erosion Control Needed	Thous. ac.	590	405	+ 243	+ 119	- 405
No till	Thous. ac.	4	54	- 48	+ 25	- 54
Chisel disc	Thous. ac.	9	132	- 122	+ 45	- 132
Conventional	Thous. ac.	577	219	+ 413	+ 50	- 219
Random Drainage Needed	Thous. ac.	224	121	+ 110	- 39	+ 97
No till	Thous. ac.	--	--	--	--	+ 58
Chisel disc	Thous. ac.	--	80	- 80	- 26	+ 53
Conventional	Thous. ac.	224	41	+ 190	- 13	- 13
Complete Drainage Needed	Thous. ac.	905	467	+ 452	- 165	+ 415
No till	Thous. ac.	--	--	--	--	+ 314
Chisel disc	Thous. ac.	--	311	- 311	- 110	+ 129
Conventional	Thous. ac.	905	156	+ 762	- 56	- 29
Outlet Needed	Thous. ac.	106	86	+ 21	- 17	+ 18
Chisel disc	Thous. ac.	--	57	- 57	- 12	+ 33
Conventional	Thous. ac.	106	29	+ 78	- 6	- 14
Unallocated	Thous. ac.	147	117	0	+ 6	+ 29
Pastureland	Thous. ac.	662	622	0	- 95	+ 34
Treatment adequate	Thous. ac.	210	298	0	+ 37	+ 34
Treatment needed	Thous. ac.	452	324	0	- 132	- 1

(Continued)

Table III.10b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Forest Land	Thous. ac.	2,177	2,112	0	- 132	+ 47
Grazed	Thous. ac.	177	152	0	- 9	+ 4
Not-grazed	Thous. ac.	2,000	1,960	0	- 122	+ 44
Estab. reinforce stand	Thous. ac.	104	98	0	- 5	+ 2
Improve timber stand	Thous. ac.	1,154	1,073	0	- 69	+ 25
Land Exceeding Soil Loss Tolerance						
Cropland	Thous. ac.	989	590	+ 472	+ 158	- 507
Pastureland	Thous. ac.	135	106	0	- 34	- 11
Forest land	Thous. ac.	371	258	0	+ 8	- 2
Other land	Thous. ac.	135	132	0	- 6	+ 2
Total	Thous. ac.	1,630	1,086	+ 472	+ 126	- 518
Critical Area Stabilization						
Gully & strip mines	Thous. ac.	80	65	0	0	0
Channel	Miles	250	250	0	0	0
Erosion (Sheet & Rill)						
Cropland	Thous. tons	12,838	8,813	+ 5,530	+ 2,635	- 4,247
Pastureland	Thous. tons	1,846	1,106	0	- 274	- 87
Forest land	Thous. tons	5,035	4,170	0	+ 58	- 22
Other land	Thous. tons	1,124	1,086	0	- 68	+ 24
Total	Thous. tons	20,843	15,175	+ 5,530	+ 2,351	- 4,332
Erosion (Critical Areas)						
Gully includes strip mine	Thous. tons	18,153	14,721	0	0	0
Channel	Thous. tons	1,186	1,186	0	0	0

(Continued)

Table III.10b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Sediment Yield	Thous. tons	2,694	2,107	+ 154	+ 202	- 331
Value of Major Agricultural Crops	Thous. dol.	553,717	734,217	- 103,104	+ 108,750	- 98,559
Production Costs of Major Agricultural Crops	Thous. dol.	376,395	456,761	- 47,929	+ 67,248	- 69,286
Net Effects						
Agricultural crops	Thous. dol.	177,321	277,456	- 55,175	+ 41,503	- 29,273
Value of Forest Products	Thous. dol.	640,000	1,097,500	0	+ 72,500	- 25,000
Conservation Treatment						
Installation	Thous. dol.	--	2,300	0	- 410	+ 766
Technical assistance	Thous. dol.	--	4,269	- 3,204	+ 677	- 500
Forest products	Thous. dol.	--	78,600	0	+ 5,300	- 1,600
Agricultural Inputs						
Fuel	Thous. gal.	32,791	29,842	+ 4,550	+ 3,218	- 3,440
Herbicides	Thous. dol.	26,544	34,557	- 6,624	+ 5,277	- 1,804
Pesticides	Thous. dol.	2,335	4,339	- 1,840	+ 721	+ 806
Fertilizer						
Nitrogen	Thous. tons	69	114	- 28	+ 17	- 19
Phosphorus	Thous. tons	60	79	- 11	+ 10	- 10
Potassium	Thous. tons	101	130	- 17	+ 13	- 14

(Continued)

Table III.10b (Continued)

Element	Unit	Current Normal	Number 1 Future Without	Number 2 OBERS	Number 3 National Economic Development	Number 4 Environmental Quality
Employment						
Major agricultural crops	Man/Year	4,685	4,362	+ 550	+ 472	- 445
Forest products	Man/Year	--	18,100	0	+ 1,200	- 400
Technical assistance	Man/Year		719	- 677	- 524	- 576

(*) Less than 500 acres.

Columns and/or rows may not add due to rounding.

APPENDIX A. NATURAL RESOURCE BASE

Introduction

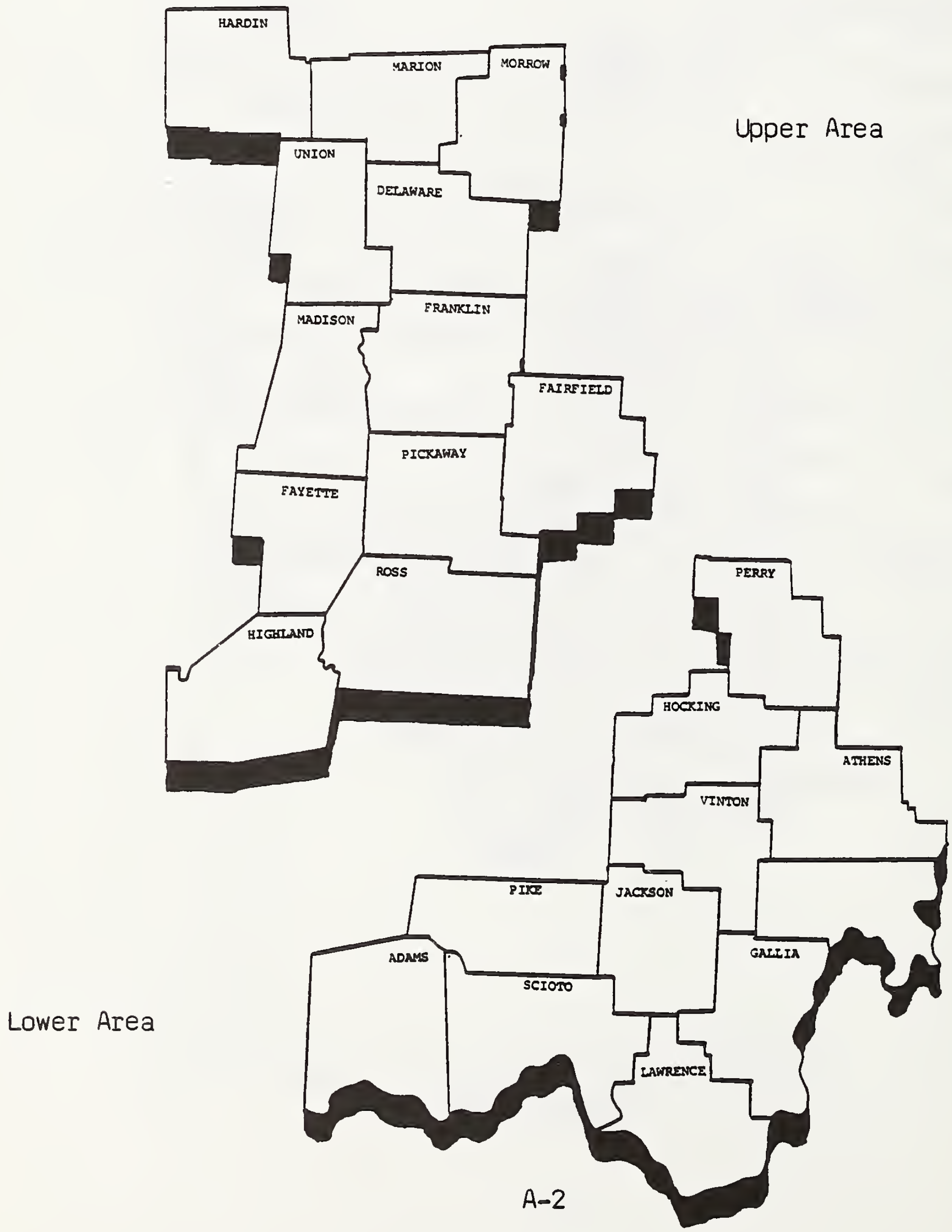
The CORB extends from central to southern Ohio and comprises a total drainage area of 10,980 square miles. The basin varies in width from approximately 50 miles in the north to 110 miles in the south with an overall average length from north to south of 150 miles. A total of 37 counties are located entirely or partially within the study area (see location map, Figure A).

Figure A.1 Central Ohio River Basin
Location Map

A county reliable statistical sample was selected by the Statistical Laboratory of Iowa State University for each of 23 counties which have over 50 percent of their area located within the basin. The sample consisted of approximately 240 Primary Sample Units of 160 acres each. Field data were collected on each sample unit on (1) land use, (2) prime farmland, (3) conservation treatment needs status, (4) erosion, (5) potential cropland, (6) flood prone areas, (7) wetlands, (8) bodies of water, and (9) forestry. These data added to other SCS collected soils, sediment, and land management data were used to compile this report.

The basin was divided into an upper area and a lower area for this study on the basis of soil and land use conditions (see map).

CENTRAL RIVER BASIN STUDY AREA



Climate

The study area is located in the north temperate zone. The climate is considered humid with warm summers and mildly cold winters. The general storm track across the area is from west to east. The average annual precipitation ranges from a high of 43 inches in the southern part of the basin to a low of 35 inches in the northern counties of Hardin and Marion. Temperatures in the area are moderate. The average annual temperature ranges from 51°F. to 58°F. Daily maximum temperatures average 37°F. in January and 85°F. in July. Daily minimum temperatures average 22°F. and 62°F. for the same months.

The growing season averages from 155 and 185 days, with the largest number of frost free days generally occurring in the southern part of the basin.

Drainage

The basin's largest stream is the Scioto River. It drains 6,510 square miles and is the third largest drainage basin in the state. The river has its origin in the flat swamplands of Hardin County and from there flows approximately 230 miles in a southerly direction to its outlet into the Ohio River at Portsmouth. The stream gradient varies from a very flat profile in the extreme upper reaches to an average fall of four feet per mile in the river's mid-section from Marion County to Columbus, with an overall average gradient of 2.3 feet per mile.

The second largest single drainage basin in the study area is the Hocking River with a drainage area of 1,200 square miles. Its source is about 35 miles southeast of Columbus and flows 95 miles southeasterly to Hockingport where it outlets into the Ohio River.

The remainder of the basin is drained by small tributaries which outlet directly into the Ohio River. These are located in the southern, unglaciated portion of the basin and generally have short, steep courses. They have a total combined drainage area of 3,270 square miles.

Figure A.2 CORB Drainage Map
Central Ohio River Basin Drainage Areas

Geology

The geologic features of the basin are quite diverse and complex with a very long history of development. Virtually every major sedimentary rock-type occurring in Ohio is represented. The formations have a slight south-easterly dip of 20 to 30 feet per mile. The oldest rocks, Ordovician lime-stone, occur in the western part of the basin with the formations becoming progressively younger from west to east. The southeastern part of the basin consists of Pennsylvanian and Permian sandstone, shale, and limestone which are rich in coal deposits. Coal mining is an important industry in the area.

The topography in the southeastern portion is well dissected by streams creating very steep ridges and narrow valleys. The northern portion of the basin was subjected to Pleistocene glaciation. The glaciers deposited thick layers of drift which had a leveling effect on topography.

Soils

The soils vary widely throughout the basin according to topography and parent material. The soils are grouped into soil associations which are essentially natural land types which contain two or more major soils in a characteristic pattern. Each soil association is named by the major soils in it. The soil association map (Figure A.3) provides the reader an idea of the major soil characteristics in each area. All of the soil associations are described.

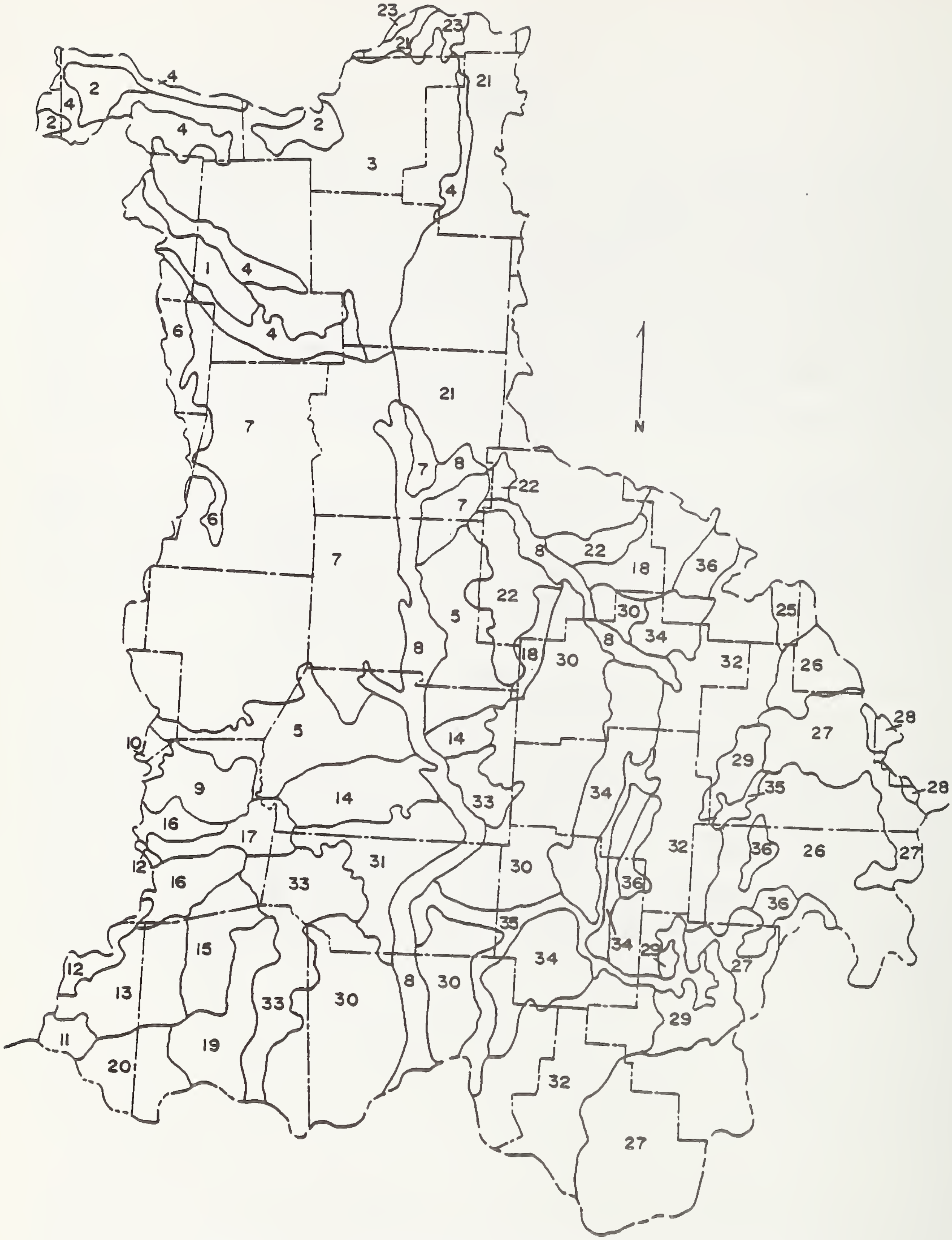


Figure A.3 Central Ohio River Basin Soil Associations

Source: Know Ohio's Soil Regions, ODNR

Central Ohio River Basin Soil Associations

Soils in High Lime Glacial Lake Sediments

The soils in this region formed in lake sediments or glacial till high in lime. These soils have high natural fertility and contain varying amounts of organic matter. They are used primarily for production of agricultural crops including corn, soybeans, wheat, and alfalfa. Tomatoes and sugar beets are also important special crops in this region.

1. Nappanee-St. Clair Association

   The soils in this association are on nearly level to moderately steep slopes. The somewhat poorly drained Nappanee soils occur on the less sloping areas and the moderately well drained St. Clair soils are on the more sloping area. These soils formed in limy clayey glacial till. Soil wetness and tilth are management problems on Nappanee soils. The clayey, impervious nature of the subsoil layers of Nappanee soils results in poor response to subsurface drainage.

2. Montgomery-Pewamo-Del Rey Association

   The relief in this association is characterized by its flatness which is broken in places by small rises. Montgomery and Pewamo soils are dark colored, very poorly drained, and lie on level relief. The Del Rey soils are light colored and somewhat poorly drained. They occur mostly on small rises. The Montgomery soils formed in clayey glacial lake sediments, Pewamo formed in glacial till and Del Rey soils formed in silty glacial lake sediments. Soil wetness is the major management problem of this association.

Soils in High Lime Glacial Drift of Wisconsin Age

The soils in this region formed in glacial drift which was derived mainly from limestone and dolomite. The soils are moderate to high in natural fertility and contain varying amounts of organic matter. Corn, soybeans, wheat, oats, and hay crops are commonly grown in the region under a mixed livestock and grain system of farming.

3. Blount-Pewamo Association

The soils in this association are nearly level to gently sloping. The light colored, somewhat poorly drained Blount soils occur on slightly elevated rises and the dark colored, very poorly drained Pewamo soils occur on nearly level areas. These soils formed in high lime silty clay loam glacial till. Soil wetness is the major management problem of this association.

4. Blount-Morley-Pewamo Association

This association consists of nearly level to gently sloping soils. The moderately well drained Morley soils are on the more sloping areas. The somewhat poorly drained Blount soils occupy nearly level to gently sloping areas and the dark colored, very poorly drained Pewamo soils are on depressed flats and upland drainageways. These soils developed in limy silty clay loam glacial till. Erosion is a management problem on Morley and Blount soils and soil wetness is a problem on Blount and Pewamo soils.

5. Miamian-Celina Association

The landscape in this association consists of sloping to moderately steep valley walls of light colored, well drained Miamian soils on the most sloping areas and the light colored, moderately well drained Celina soils on the less sloping areas. These soils formed in limy loam glacial till. Susceptibility to erosion is the main management problem.

6. Miamian-Brookston-Crosby Association

The soils in this association are nearly level to rolling. The well drained, light colored Miamian soils occur on the more sloping areas, the somewhat poorly drained, light colored Crosby soils occur on the less sloping areas and the very poorly drained, dark colored Brookston soils occur on nearly level or depressional areas. These soils formed in limy loam glacial till. Erosion is a management problem on Miamian soils and soil wetness is a problem on Crosby and Brookston soils.

7. Brookston-Crosby Association

This association consists mostly of broad, flat expanses of dark colored, very poorly drained Brookston soils and small, slightly higher rises of light colored, somewhat poorly drained Crosby soils. Both of these soils formed in limy loam glacial till. Soil wetness is the major management problem.

8. Fox-Genesee-Ockley Association

The landscape in this association consists of broad, nearly level soils on terraces and first bottoms. Fox, Ockley and Genesee soils are light colored and well drained. Fox soils formed in limy outwash gravel and sand, Ockley soils formed in loamy material over limy outwash gravel and sand and Genesee soils formed in stream sediments. Other included soils are the dark colored, well drained Ross soils on floodplains. Droughtiness is a management problem on Fox soils and periodic stream overflow is a problem on Genesee soils.

9. Russell-Miamian-Xenia-Wynn Association

This association consists of nearly level to steep soils. The well drained Russell, Miamian and Wynn soils are on the more sloping areas. The moderately well drained Xenia soils are on the less sloping areas. Russell and Xenia soils formed in silty material over limy loam glacial till, Miamian soils formed in loam glacial till and Wynn soils formed in

silty material over loam glacial till which, in turn, is underlain by limestone bedrock at 2 to 4 feet. Susceptibility to erosion is the main management problem on these soils.

10. Ragsdale-Fincastle Association

The soils in this association are nearly level to undulating. The light colored, somewhat poorly drained Fincastle soils occupy the slightly elevated areas and the dark colored, very poorly drained Ragsdale soils are on nearly level areas and in depressions. These soils formed in silt over limy loam glacial till. Soil wetness is the major management problem.

Soils in Glacial Drift of Illinoian Age

The soils in this region formed in glacial drift which was derived from limestone, sandstone or shale. These soils are commonly deeply leached, strongly acid and moderately low in fertility. Cash grain and general farming are the primary types of agriculture. More steeply sloping areas are in woodland or pasture.

11. Rossmoyne-Eden-Cincinnati-Edenton Association

The landscape in this association consists of broad areas of gently sloping hilltops interspersed with strongly sloping valleys. The moderately well drained Rossmoyne soils occupy the gently sloping hilltops and the well drained Eden, Cincinnati and Edenton soils occupy the more sloping areas. Eden soils formed in residuum of interbedded soft limy shales and siltstones with thin interbedded limestones. Rossmoyne and Cincinnati soils formed in silty material over limy clay loam glacial till. Edenton soils formed in limy clay loam glacial till over residuum from interbedded shale and limestone. Susceptibility to erosion is the main management problem on these soils.

12. Rossmoyne-Hickory Association

The soils in this association are gently sloping to steep. The light colored, moderately well drained Rossmoyne soils are gently to strongly sloping and the light colored, well drained Hickory soils are moderately sloping to steep. The soils in this association formed in silty deposits underlain by limy loam glacial till. Erosion control is the major management problem of this association. In addition, occasional wet spots on Rossmoyne soils may require artificial drainage.

13. Rossmoyne-Edenton-Loudon Association

This association of light colored soils consists of gently sloping to ridgetops adjacent to moderately steep to very steep drainageways. Rossmoyne soils formed in silty material over lime loam glacial till. The Edenton soils on the steeper slopes formed in thin, limy glacial till over interbedded shale and limestone and the Loudon soils developed in silty deposits and clayey glacial till over limy clay shale bedrock. Steeply sloping topography is the major use limitation of the soils in this association for both farm and nonfarm purposes. There is a moderate to severe erosion hazard on areas not protected by a vegetative cover.

14. Cana-Rossmoyne-Latham Association

The landscape in this association consists of valleys and ridges having a great range in elevation. The well drained Cana and Latham soils are on the steeper slopes along the sides of the valleys and the moderately well drained Rossmoyne soils are on the ridgetops. Cana soils formed in 20 to 40 inches of glacial till over acid shale bedrock. Rossmoyne soils formed in silty material over clay loam glacial till and Latham soils developed in acid shale bedrock. Erosion on steep slopes is the main management problem on Cana and Latham soils.

15. Loudon-Edenton-Bratton Association

The soils in this association are gently sloping to steep. The Loudon soils developed in silty deposits and clayey glacial till over limy clay shale bedrock. They are light colored, moderately well drained and occupy gently to strongly sloping topography. The well drained Edenton soils developed in clay loam glacial till that overlies interbedded limy shale and limestone. These soils typically occur near the top of steep slopes. The well drained, light colored Bratton soils formed in silt over clayey residuum from limestone. They are on moderately sloping to moderately steep topography. The major farm management problem of this association is erosion control. Shallowness to bedrock, clayey subsoils with poor stability, and steep slopes are severe limitations for many nonfarm uses.

16. Boston-Bratton-Rossmoyne Association

The soils in this association are on gently to moderately sloping uplands and terraces. The well drained Boston soils developed in silty deposits over loamy glacial till that, in turn, overlies clayey limestone residuum from limestone. The moderately well drained Rossmoyne soils formed in silty deposits overlying loamy glacial till. The well drained, light colored Bratton soils formed in silt over clayey residuum from limestone. Susceptibility to erosion is the main management problem on these soils. Seasonal wetness is a use limitation on the level to gently sloping areas of Rossmoyne soils.

17. Haubstadt-Otwell-Negley Association

This association occurs primarily on gently sloping to moderately steep slopes along major stream valleys. The light colored, moderately well drained Haubstadt and Otwell soils formed in silty deposits overlying stratified (layered), loamy outwash that, in turn, overlies the gravel. The light colored, well drained Negley soils formed in thin or no silty

deposits overlying sand and gravel. Erosion is the major management hazard when the major soils in this association are cultivated. Seasonal wetness is a use limitation on the Haubstadt soils.

18. Hanover-Muskingum-Alford Association

The soils in this association are mostly deep and well drained. They are on hilly uplands. The Hanover and Muskingum soils are on the side slopes and the Alford soils are on the ridgetops. The Hanover soils formed in loam glacial till, the Muskingum soils formed in siltstone bedrock, and the Alford soils formed in silty material. Steepness of slope and erosion are the major management problems on the soils in this association. More than half of the soils in this association are in cropland.

Soils in Limestone and Shale

The soils in this region formed mainly in limestone, interstratified limy shale and limestone. Much of this region is hilly and made up of narrow ridges and steep slopes bordering narrow valleys. The fertility of these soils ranges from high to low. Much of the region is in pasture or woodland. Tobacco is an important crop on the less sloping areas.

19. Bratton-Opequon-Lawshe-Nicholson Association

The soils in this association are gently sloping to very steep. The Bratton soils are light colored, well drained and formed in silty over clayey residuum derived from limestone. Opequon soils are light colored, well drained and formed in clayey residuum over limestone bedrock. The Lawshe soils are dark colored, moderately well drained and formed in limy clay shale. Nicholson soils are light colored, moderately well drained and formed in silty material over limestone residuum that, in turn, overlies limy shales and siltstones. Erosion control is the major management problem of this association. Much of it

is used for meadow or pasture and a smaller part is in forest or not managed. Tobacco is a specialized crop of major importance that is grown on cultivated areas of the association.

20. Eden-Bratton-Opequon Association

This association occupies moderately steep to very steep hillsides and valley walls of deep drainageways. The well drained Eden soils formed in materials derived from interbedded shale and limestone bedrock. The well drained Bratton soils formed in silt over clayey residuum derived from limestone. The well drained Opequon soils formed in thin, silty deposits overlying limestone bedrock. Steep slopes and shallowness to bedrock are major limitations to many farm uses of the soils in this association. Because of the steep slopes, shallowness to bedrock, and droughtiness hazards, this association has severe limitations for many nonfarm uses.

Soils in Low Lime Glacial Drift of Wisconsin Age

The soils in this region formed in glacial drift of Wisconsin age which was derived mainly from sandstone, shale and low amounts of limestone. They are generally low in fertility and organic matter and are acid. General farming and dairying are the principal types of agriculture.

21. Bennington-Cardington-Pewamo Association

This association consists mainly of nearly level to gently sloping soils in broad areas, but a few small areas of very steep soils are along the breaks of the main streams. The Bennington soils are light colored, nearly level to gently sloping, and somewhat poorly drained. Cardington soils are light colored and moderately well drained and Pewamo soils are dark colored, nearly level, and very poorly drained. The soils in this

association formed in limy clay loam glacial till. Soil wetness is a management problem on Bennington and Pewamo soils and erosion is a management problem on Cardington soils.

22. Cardington-Alexandria-Bennington Association

This association consists of nearly level to sloping uplands. The Cardington soils are mostly gently sloping to steep and are moderately well drained. The Alexandria soils are well drained and sloping to strongly sloping. The Bennington soils are light colored, nearly level to gently sloping, and somewhat poorly drained. The soils in this association formed in limy clay loam glacial till. Erosion is the major management problem on these soils. Soil wetness is a problem on Bennington soils.

23. Tiro-Luray Association

This association consists of level to gently sloping soils. The light colored, somewhat poorly drained Tiro soils occur on the slightly elevated slopes and the very poorly drained, dark colored Luray soils occur on the lower lying positions. The Tiro soils formed in silt over loam glacial till and the Luray soils formed in glacial lake-laid silt. Soil wetness is the major management problem. Soil stability is a problem on Luray soils.

24. Bogart-Chili-Jimtown Association

This association occupies nearly level to undulating terraces. The dominant Bogart soils are moderately well drained, the Chili soils are well drained, and the Jimtown soils are somewhat poorly drained. These soils formed in outwash sand and gravel. Droughtiness is a management problem on Chili soils and soil wetness is a problem on Jimtown soils.

Soils in Sandstone and Shale

The soils in this region formed mainly over acid sandstone and shale, although some soils formed over limestone or limy shale. The soils are often moderately deep, low in natural fertility and organic matter and are acid. Much of the land is too steep or shallow for cultivation; therefore, a relatively high proportion of the land is in forest or pasture. General farm crops are grown on the more gently slopes. Strip mining, which is common in some areas, contributes sediment and toxic acid to some streams.

25. Gilpin-Upshur-Guernsey Association

    This association consists of well drained, shallow to moderately deep, upland soils which are sloping to steep. Gilpin soils formed over interbedded siltstone, gray shale, and sandstone. Upshur soils formed over red clay shale and Guernsey soils formed over limy and nonlimy shales interbedded with siltstone and dolomitic limestone. Erosion and steepness of slope are the major management problems on the soils in this association. About one half of the soils in this association are forested.

26. Upshur-Gilpin-Woodsfield Association

    This soil association is on moderately steep to steep side slopes and broad gently sloping ridgetops. The soils formed in varying thicknesses of silt over interlayered red clay shale and siltstone. This soils association is used for general farming. The soils on the ridgetops are easily managed and afford enough cropland to maintain a permanent productive agriculture. The soils of this association are suited for limited nonfarm uses. About half the area of the association is forested.

27. Gilpin-Dekalb Association

This association consists of well drained, deep and shallow upland soils which are sloping to steep. These unglaciated soils are underlain by siltstone and sandstone. Steepness of slope and erosion are the major management problems. More than half the area of this association is forested.

28. Upshur-Gilpin-Zanesville-Dekalb Association

The soils in this association are on moderately steep to steep side-slopes and wide, gently sloping and sloping ridgetops. The well drained Upshur, Gilpin, and Dekalb soils are on the side slopes and the well drained Zanesville soils are on the ridgetops. Upshur soils formed over red clay shale, Gilpin soils formed over interbedded siltstone and gray shale, Dekalb soils formed over sandstone, and Zanesville soils formed in silt over siltstone and sandstone. Steepness of slope and erosion are major management problems on these soils. Nearly one half the area of this association is in forest.

29. Upshur-Gilpin-Monongahela Association

The soils in this association are on hilly to modertely steep uplands interspersed with old high terrace remnants. The well drained Upshur soils formed over red clay shale and the well drained Gilpin soils formed over siltstone. The moderately well drained Monongahela soils formed in water-deposited material. The soils in this association are too steep for most farm and nonfarm uses. Less sloping areas of Monongahela soils are suited to and used for homesites and growing cultivated crops. The soils in this association are mainly used for forest or pasture.

30. Muskingum-Berks Association

This association consists of well drained, moderately deep Muskingum soils and well drained, shallow Berks soils which are sloping to steep. Underlying these unglaciated soils is bedrock including siltstone, sandstone, and shale. Erosion and steepness of slope are the major management problems on the soils of this association. Shallowness to bedrock is a problem on Berks soil. The soils in this association are dominantly forested.

31. Latham-Muskingum Association

This association consists of well drained, shallow Latham soils and well drained, moderately deep Muskingum soils which are mainly sloping to steep. These unglaciated soils are underlain by interbedded siltstone and acid shale. Steepness of slope, erosion, and shallowness to bedrock are the major management problems on the soils in this association. About half of this association is in forest.

32. Muskingum-Dekalb-Latham Association

This association consists of well drained, moderately deep Muskingum and Dekalb soils and well drained, shallow Latham soils that are mostly steep. These unglaciated soils are underlain by interbedded siltstone, sandstone and acid shale. Steepness of slope, erosion, and shallowness to bedrock are the major management problems on the soils in this association. Most of this association is in forest.

33. Colyer-Trappist-Berks Association

The soils in this association are mostly moderately sloping to very steep. Colyer and Trappist soils are well drained and formed over acid shale bedrock. The stony, well drained Berks soils are on steep landscape positions and underlain by sandstone bedrock. The major nonfarm use limitations of this association are shallowness to bedrock

and steep to very steep slopes having a severe erosion hazard. Low productivity, extreme soil acidity, droughtiness, and stoniness are additional limitations for most farm uses. The soils in this association are dominantly forested.

34. Gilpin-Latham-Dekalb Association

The soils in this association are on hilly to steep slopes and are well drained and moderately deep. Gilpin soils formed over interbedded siltstone and gray shale, Latham soils over gray clay shale, and Dekalb soils over sandstone. Steepness of slope and erosion are the major management problems on these soils. More than half of this association is in forest.

35. Monongahela-Allegheny Association

This association consists of deep, moderately well and well drained soils on level to sloping terraces. The Monongahela and Allegheny soils formed in water-deposited material. The soils in this association are extensively used for growing cultivated crops. The Monongahela soils have limitations for many nonfarm uses because of wetness and unstable silts in the substratum. Nearly one half of this association is in cropland.

36. Muskingum-Berks Association

This association consists of well drained, moderately deep Muskingum soils and well drained, shallow Berks soils which are sloping to steep. Underlying these unglaciated soils is bedrock including siltstone, sandstone, and shale. Erosion and steepness of slope are the major management problems on the soils of this association. Shallowness to bedrock is a problem on Berks soils. The soils in this association are dominantly forested.

Major Land Resource Areas

The CORB contains portions of six Major Land Resource Areas (MLRA). Each MLRA has its own distinct set of soil conditions and management problems. The six MLRAs are described below and located on Figure A.4.

MLRA 111 Indiana-Ohio Till Plain

This MLRA contains soils formed in Wisconsin age glacial drift. It occupies 44 percent of the basin and contains most of the upper basin area.

MLRA 139 Eastern Ohio Till Plain

The soils in this area were formed in the Illinoian glacial till and residual bedrock. It occupies about two percent of the basin area and is located along the boundary between the upper and lower basin areas in Fairfield and Perry Counties.

MLRA 114 The Southern Illinois and Indiana Thin Loess Till Plain

The soils of this area were formed in deeply weathered Illinoian drift. This MLRA occupies about six percent of the total basin area.

MLRA 121 Kentucky Blue Grass

This MLRA consists of a rolling landscape with soils formed in limestone bedrock. It is located in the southwest corner of the basin and occupies about three percent of the basin area.

MLRA 124 Western Allegheny Plateau

This area is a dissected plateau which is quite hilly in nature. It contains soils formed primarily in thick sandstone bedrock formations. It occupies about 31 percent of the basin.

MLRA 126 Central Allegheny Plateau

This area is very similar in topography, soils, and land use to MLRA 124. The bedrock of the area consists of thinner and more variable beds of sandstone shale and limestone. The area occupies about 14 percent of the total basin.

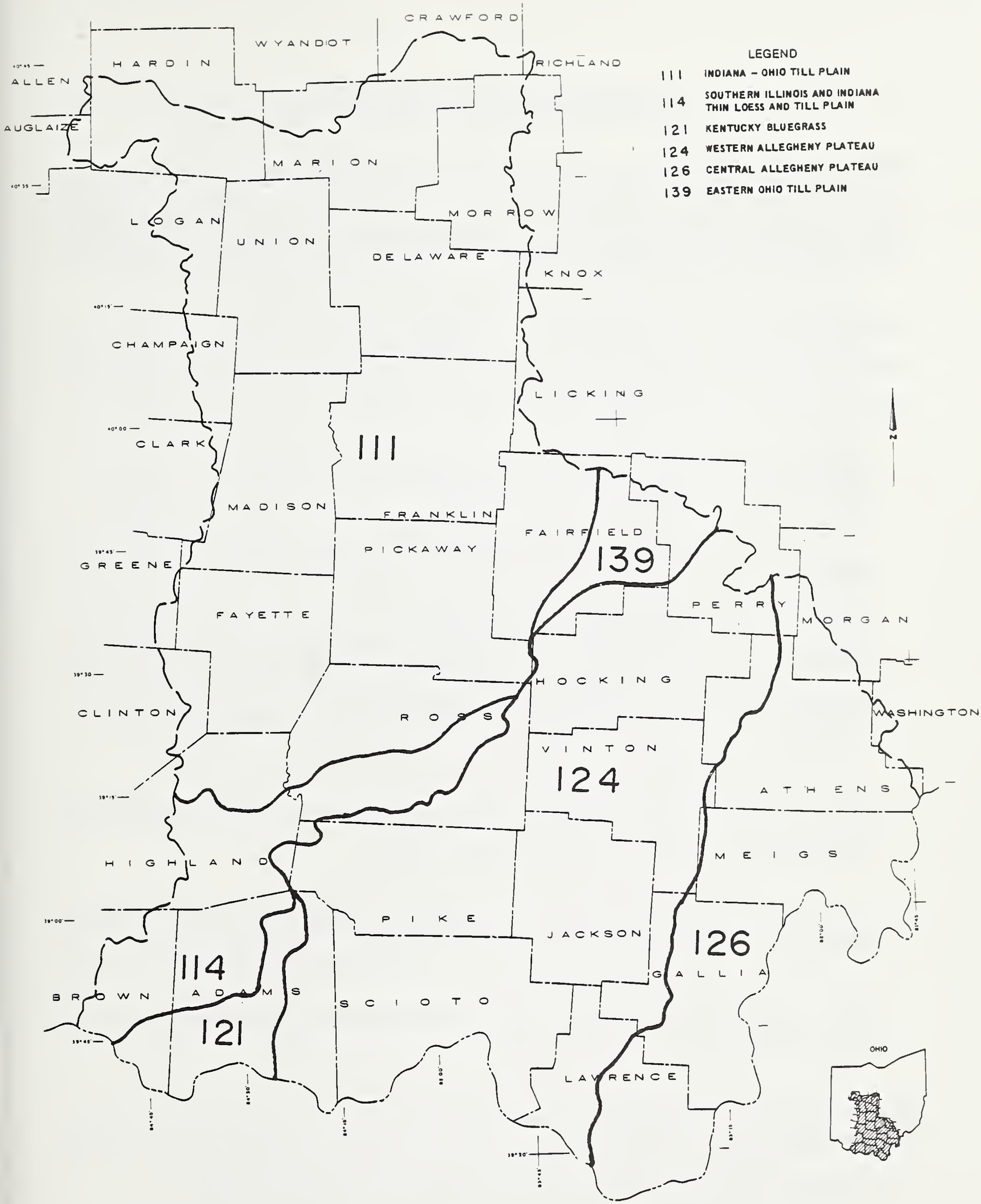


Figure A.4 Central Ohio River Basin Major Land Resource Areas

Land Capability Classification

Soils can be classified in a number of ways. USDA uses a land capability classification system that groups soils on the basis of their ability to produce common cultivated crops and pasture plants without deterioration. Land capability classes and subclasses are based on detailed soil surveys.

Capability classes are designated by Roman numerals I through VII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants.

Class III soils have severe limitations that reduce the choice of plants.

Class IV soils have very severe limitations that reduce the choice of plants.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Major hazards are designated by lower case letters "e" erosion, "w" wetness, and "s" drouthiness or stoniness. Table A.1 shows the distribution of soils in each class and subclass for the upper, lower, and total basin.

Table A.1 - Acres by capability class in the Central Ohio River Basin Rural Land in 1979.

Land Capability Class and Subclass	Upper	Lower	Basin
	---	Acres	---
I	68,007	97,317	165,324
IIe	785,897	232,518	1,018,415
IIw	1,580,480	137,841	1,718,321
IIs	30,581	830	31,411
IIIe	223,753	400,413	624,166
IIIw	181,666	32,115	213,781
IIIs	0	2,623	2,623
IVe	113,460	576,352	689,812
IVw	1,775	427	2,202
IVs	0	7,848	7,849
V	1,522	409	1,931
VIe	87,179	700,234	787,413
VIs	2,963	54,108	57,071
VIIe	63,164	499,762	562,926
VIIs	58,398	135,793	194,191
TOTAL	3,198,845	2,878,590	6,077,435

Source: CORB Resources Inventory

Prime Farmland

The basin's prime farmland was inventoried. Most of it is located within the upper area. Figure A.5 is a map which shows the percent of each county that is prime farmland. All of the counties in the lower basin have less than 25 percent prime farmland. All of the upper basin counties have in excess of 25 percent prime farmland with a majority having greater than 75 percent prime farmland. The only exceptions are the transitional counties of Highland, Ross, Fairfield, and the highly urbanized Franklin County. Seven counties have in excess of 200,000 acres of prime farmland (Table A.2). All have less acres of cropland than they have of prime farmland. The basin contains a total of 2,888,428 acres of prime farmland.

Land Use

The largest single land use in the basin is cropland which occupies about 2.9 million acres (Figure A.6) or 42 percent. Most of the cropland 2.4 million acres occurs in the upper basin (Figure A.7). The second greatest land use is forest land with about 2.2 million acres. Most of it, 1.8 million acres, is located in the lower basin. Urban and built-up land occupies about .6 million acres, or 10 percent. About 60 percent of the urban land is located in the upper basin with the remaining 40 percent in the lower.

Pastureland occupies about 10 percent with two-thirds of it located in the lower basin. The upper and lower basins are quite different in land use. The upper basin is extensively cropped and has a large expanding urban center in Columbus. The lower basin has vast areas of forest land and is largely rural. A lot of its urban area is on the southern fringes of the Columbus metropolitan center.

Figure A.8 shows rural land use trends by county. The acres of a particular rural land use are represented by the size of the figure representing that land use. Cropland is represented with a tractor, pasture with a cow, and forest land with a group of trees. The sharp contrast in land use can be quickly visualized.

Table A.3 contains a detailed break down of land use by county.

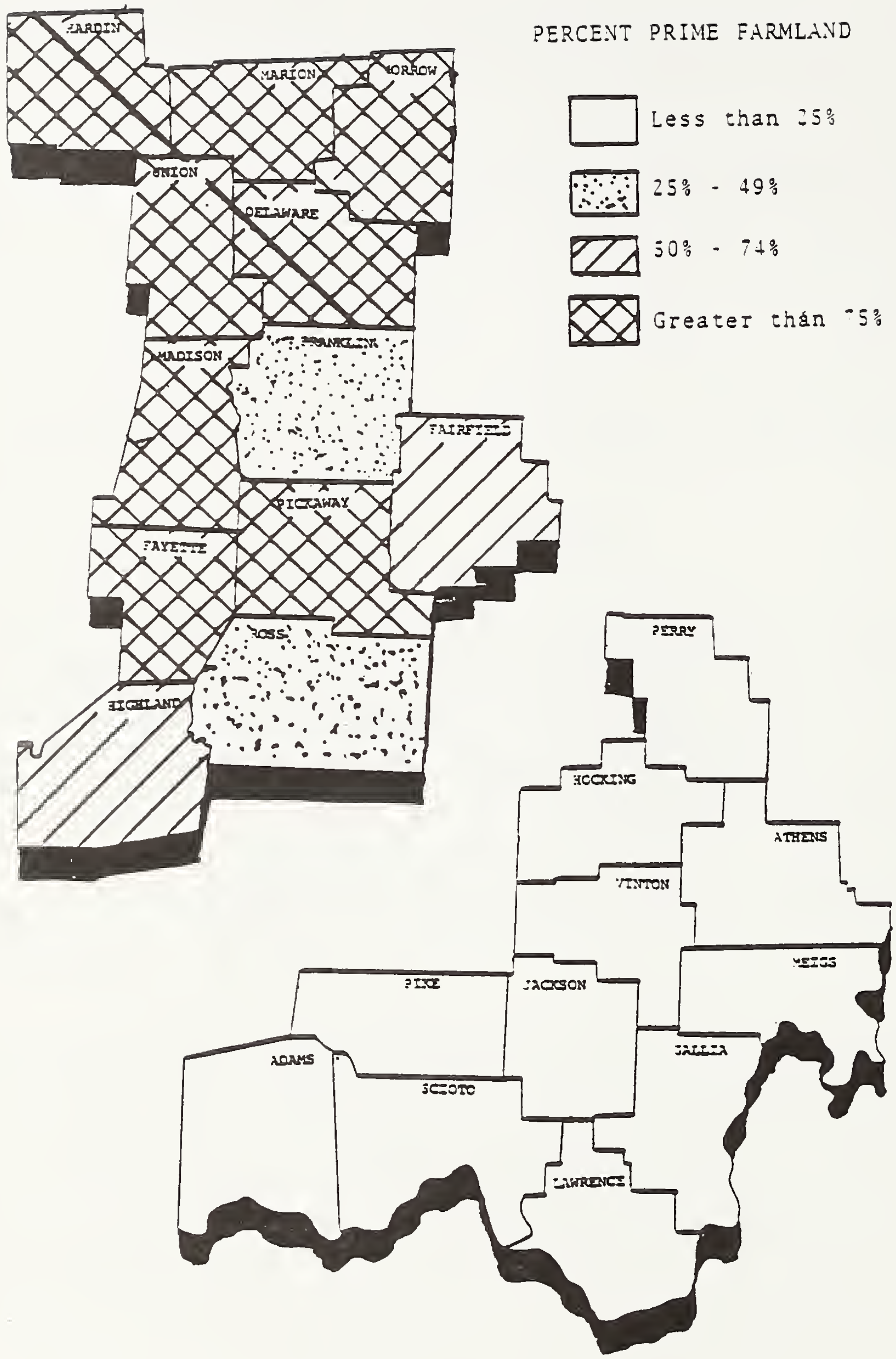


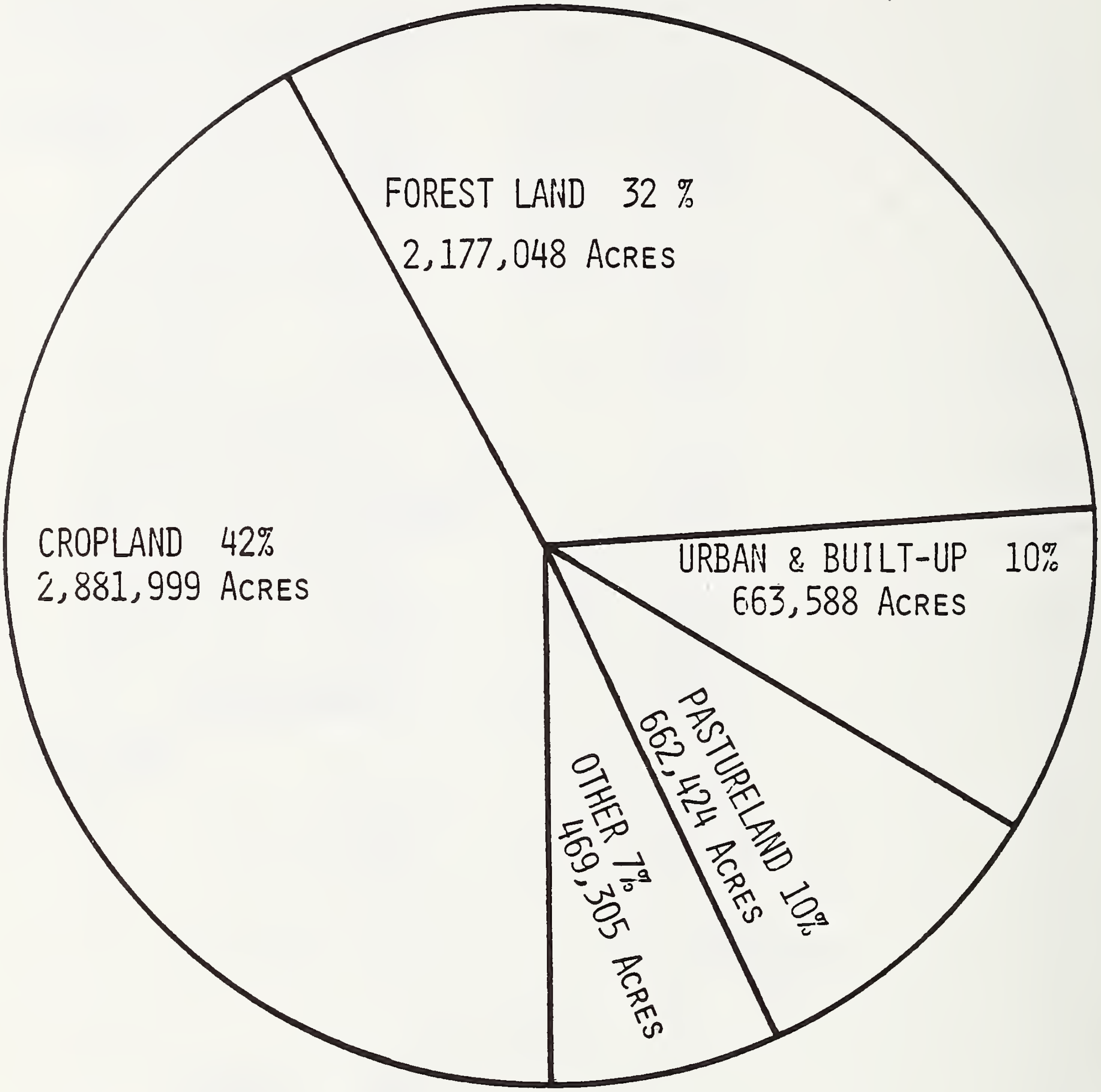
Figure A.5 Central Ohio River Basin
Percent Prime Farmland By County

Table A.2 - Acres and Percent of Prime Farmland by County

	Total Acres	Prime Farmland Acres	Percent Prime Land
Adams	376,217	72,119	19
Athens	311,911	32,125	10
Delaware	272,874	209,393	77
Fairfield	321,724	185,942	58
Fayette	257,413	230,791	90
Franklin	339,109	134,635	40
Gallia	291,322	30,856	11
Hardin	298,880	270,624	91
Highland	344,242	198,256	58
Hocking	248,651	26,562	11
Jackson	267,500	22,238	8
Lawrence	238,501	13,202	6
Madison	296,369	248,869	84
Marion	257,530	217,936	85
Meigs	278,938	16,002	6
Morrow	257,380	191,959	75
Perry	243,550	33,527	14
Pickaway	319,557	260,451	82
Pike	279,520	51,974	19
Ross	434,174	162,978	38
Scioto	380,552	41,934	11
Union	277,760	218,228	79
Vinton	260,690	17,827	7
TOTAL	6,854,364	2,888,428	42

Source: CORB Natural Resource Inventory

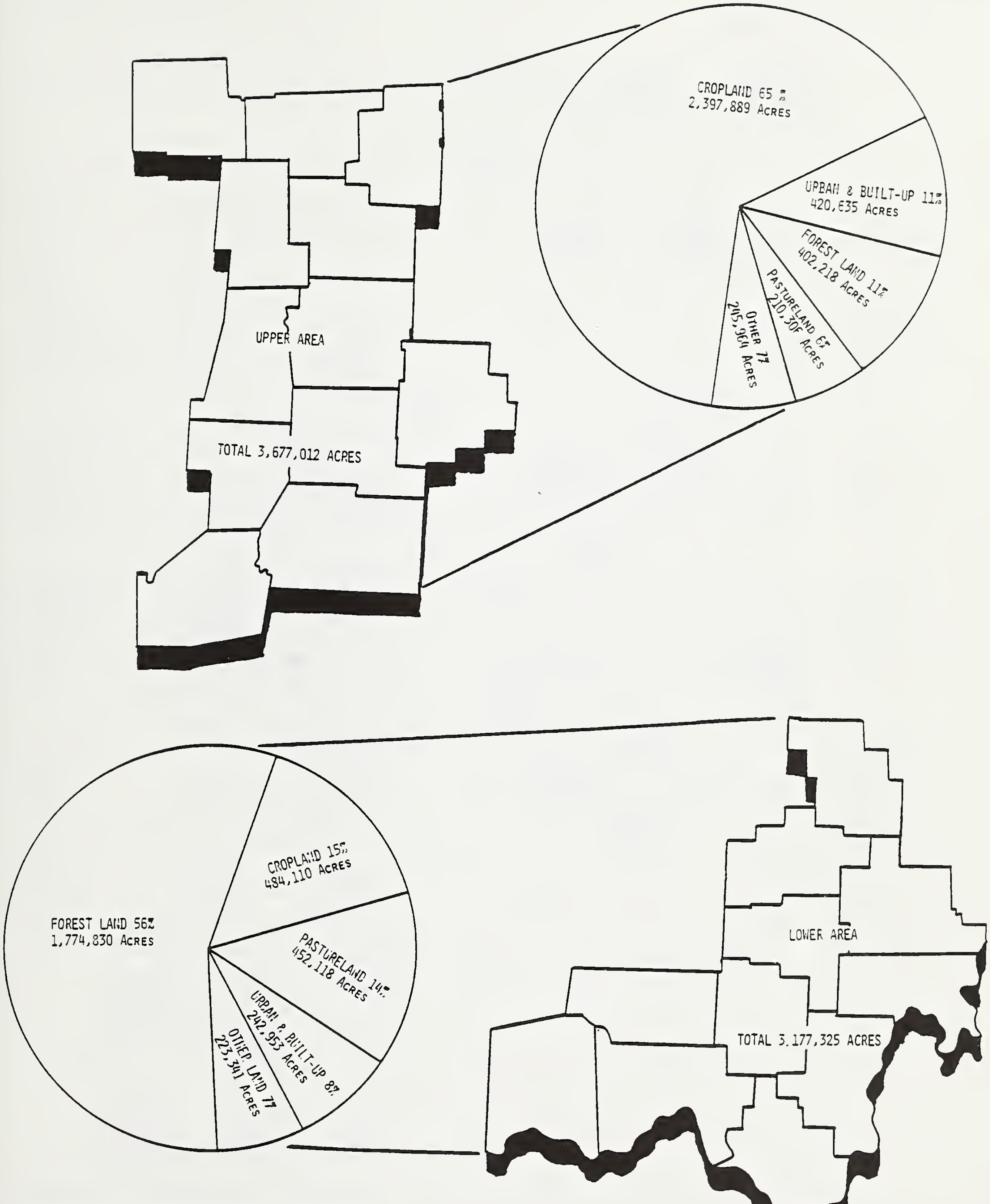
LAND USE
CENTRAL OHIO RIVER BASIN



TOTAL 6,854,364 ACRES

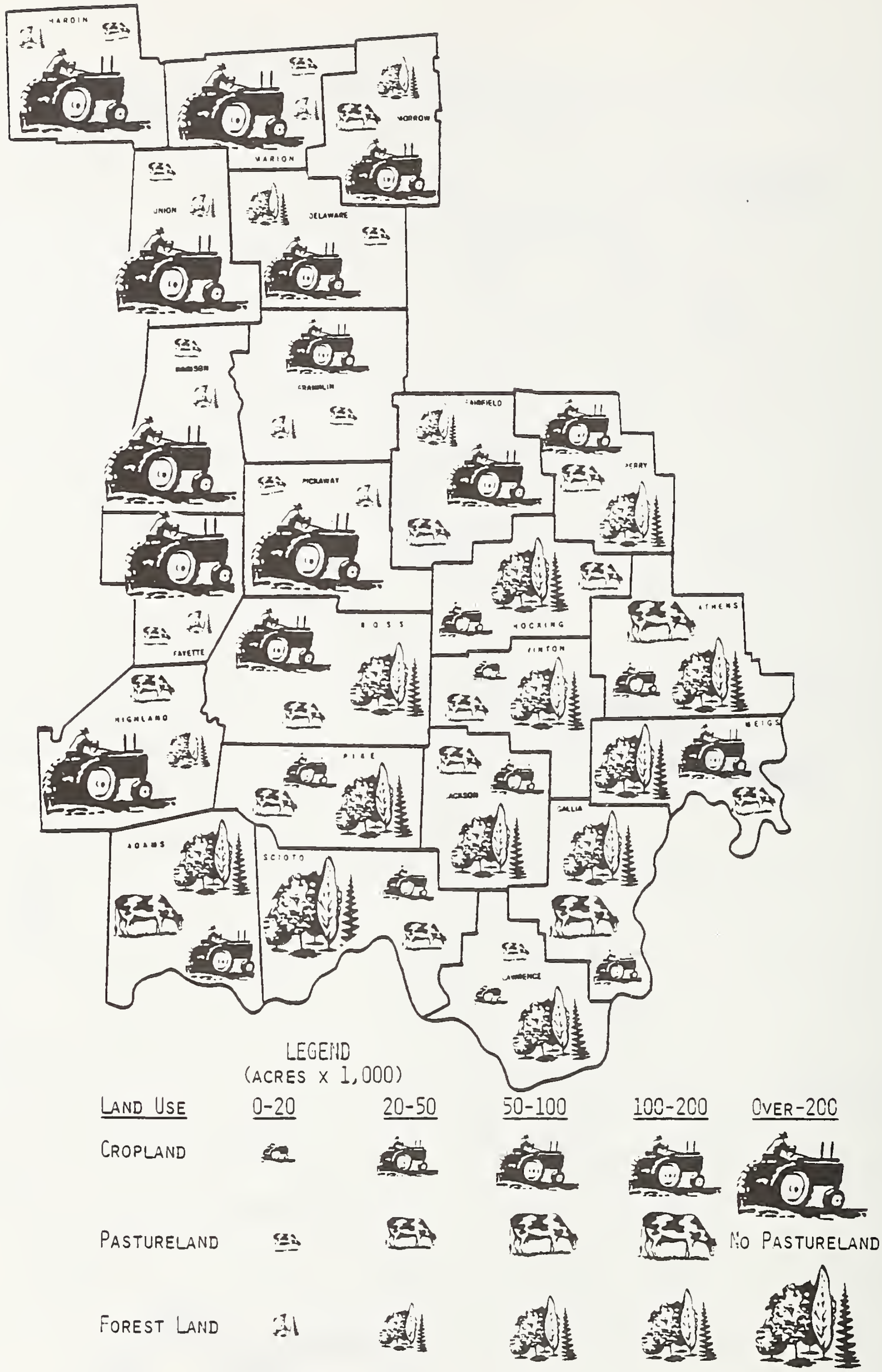
Source: CORB Resource Inventory

Figure A.6 Land Use
Central Ohio River Basin



Source: CORB Erosion Inventory

Figure A.7 Central Ohio River Basin Land Use
Lower and Upper Areas



Source: CORB Natural Resource Inventory

Figure A.8 Central Ohio River Basin Agricultural Land Use by County

Table A.3 - Central Ohio River Basin Use of Non-Federal Land
1979 by County

County	Cropland	Pastureland	Forest Land	Urban & Build Up	Other	Total
Adams	85,877	65,509	190,470	9,013	25,348	376,217
Athens	38,091	72,510	157,412	18,648	25,250	311,911
Delaware	163,217	13,108	26,639	25,876	44,034	272,874
Fairfield	188,143	30,966	44,103	34,977	23,535	321,724
Fayette	221,579	18,970	2,018	10,830	4,016	257,413
Franklin	111,834	12,651	13,663	181,627	19,334	339,109
Gallia	45,505	53,603	153,483	23,638	15,093	291,322
Hardin	242,747	11,982	21,745	11,655	10,751	298,880
Highland	228,986	31,739	45,231	23,578	14,708	344,242
Hocking	36,326	32,479	152,140	11,415	16,291	248,651
Jackson	38,524	40,113	154,096	16,418	18,349	267,500
Lawrence	18,338	18,337	147,068	40,517	14,241	238,501
Madison	243,589	14,071	9,233	13,238	16,238	296,369
Marion	203,147	5,929	9,090	29,359	10,005	257,530
Meigs	50,175	47,148	157,880	12,586	11,149	278,938
Morrow	160,257	23,981	30,072	24,886	18,184	257,380
Perry	68,260	22,890	98,507	17,870	36,023	243,550
Pickaway	256,627	15,321	10,535	21,353	15,723	319,557
Pike	49,160	38,235	152,942	8,920	30,263	279,520
Ross	176,235	22,368	170,134	26,173	39,264	434,174
Scioto	34,169	31,581	243,325	47,414	24,063	380,552
Union	201,528	9,220	19,757	17,083	30,172	277,760
Vinton	19,685	29,713	167,507	36,514	7,271	260,690
TOTAL	2,881,999	662,424	2,177,048	663,588	469,305	6,854,364

Source: CORB Natural Resources Inventory 1979

Cropland

Cropland in the basin represents a tremendous resource. It occupies 2,881,999 acres and produces a total gross annual production of $553,717,000 worth of agricultural products.

The cropland varies in quantity and quality throughout the basin, about 83 percent is in the upper area. Table A.4 shows the distribution of cropland in the upper and lower basin by capability class.

Table A.4 - Distribution of Cropland by Capability Class and Subclass

Land Capability Class and Subclass	Upper	Lower	Basin
		-acres-	
I	54,077	58,416	112,493
IIe	637,043	136,603	773,646
IIw	1,340,094	65,102	1,405,196
IIs	25,703	433	26,136
IIIe	127,637	120,803	248,440
IIIw	151,416	15,820	167,236
IIIs	0	0	0
IVe	39,157	57,158	96,315
IVw	1,775	427	2,202
IVs	0	550	550
V	0	0	0
VIe	16,012	20,584	36,596
VIs	907	6,136	7,043
VIIe	4,068	976	5,044
VIIs	0	1,102	1,102
TOTAL	2,397,889	484,110	2,881,999

Source: CORB Natural Resources Inventory

Cropland Erosion

Cropland erosion is a very serious problem in the basin. Approximately 13 million tons of soil are lost each year from cropland as a result of erosion. Over 10 million tons of this are lost in the upper basin. Soil erosion in the upper basin is a far greater problem than in the lower basin as a result of the large acreage of continuous row crops (see Table II.3 Normal and Projected Acreage of Major Crops CORB).

The average soil loss on cropland is 4.4 tons per acre per year. Soil loss becomes a problem when the rate of erosion exceeds the "T" factor for the individual soil type. The "T" factor, or tolerance factor, is defined as the maximum average annual soil loss through erosion that a given soil can sustain without reducing its productive capacity.

Currently 1,041,239 acres, or 36 percent, of the total cropland are eroding at rates higher than "T". This represents a threat to the future productivity of the basin.

Table A.5 shows the number of acres of cropland eroding at rates within specified ranges by county, in the upper area, lower area, and total basin. The most acres and the highest percent of cropland eroding above tolerable rates occurs in the upper area.

Table A.6 shows the total amount of erosion in each county and compares it to the total acres of cropland. It also shows the number of acres eroding in excess of the "T" factor.

Table A.5 - Acres of Cropland by Erosion Rates, Upper Area
Rate in Tons/Acre/Year

County	0-2	2-"T"	"T"-10	10-30	30
	Tolerable		Exceeds Tolerable		
Adams	29,180	10,458	27,526	15,962	2,751
Athens	28,454	1,377	3,672	4,130	458
Delaware	54,966	37,636	63,849	5,497	1,269
Fairfield	56,301	54,425	45,043	25,805	6,569
Fayette	85,564	45,202	86,373	2,825	1,615
Franklin	28,843	31,373	45,546	5,060	1,012
Gallia	28,537	5,397	5,785	4,629	1,157
Hardin	101,179	37,280	94,969	9,319	0
Highland	79,642	65,635	55,321	24,825	3,513
Hocking	15,385	9,402	7,264	3,420	855
Jackson	30,184	3,971	2,781	1,588	0
Lawrence	2,934	11,372	4,032	0	0
Madison	73,422	65,511	76,073	26,384	2,199
Marion	134,373	45,855	22,919	0	0
Meigs	24,652	7,786	13,409	3,896	432
Morrow	53,296	34,634	59,007	11,417	1,903
Perry	29,428	16,760	11,444	8,585	2,043
Pickaway	117,785	72,771	56,497	9,095	479
Pike	22,303	10,927	9,102	3,642	3,186
Ross	61,005	47,450	35,925	25,077	6,778
Scioto	14,496	12,426	6,211	1,036	0
Union	92,640	30,293	61,471	16,246	878
Vinton	14,860	3,340	1,114	0	371
Total	1,179,479	661,281	795,333	208,438	37,468
Upper Area Total	939,066	568,065	702,993	161,550	26,215
Lower Area Total	240,413	93,216	92,340	46,888	11,253

Source: CORB Resource Inventory

Table A.6 - Central Ohio River Basin Sheet and Rill Erosion on Cropland by County

County	Acres	Tons/Year	Tons/ Acre/Yr	Acres Erosion Over "T"
Adams	85,877	549,291	6.40	46,239
Athens	38,091	114,463	3.00	8,260
Delaware	163,217	662,056	4.06	70,615
Fairfield	188,143	1,156,922	6.15	77,417
Fayette	221,579	771,124	3.48	90,813
Franklin	111,834	488,539	4.37	51,618
Gallia	45,505	225,427	4.95	11,571
Hardin	242,747	830,438	3.42	104,288
Highland	228,986	1,170,892	5.11	83,659
Hocking	36,326	195,596	5.38	11,539
Jackson	38,524	66,504	1.73	4,369
Lawrence	18,338	59,172	3.23	4,032
Madison	243,589	1,308,290	5.37	104,656
Marion	203,147	376,588	1.85	22,919
Meigs	50,175	186,426	3.72	17,737
Morrow	160,257	769,514	4.80	72,327
Perry	68,260	405,928	5.95	22,072
Pickaway	256,627	811,175	3.16	66,071
Pike	49,160	378,845	7.71	15,930
Ross	176,235	1,268,428	7.20	67,780
Scioto	34,164	98,418	2.88	7,247
Union	201,528	786,113	3.90	78,595
Vinton	19,685	56,935	2.89	1,485
Total	2,881,999	12,737,084	4.42	1,041,239
Upper Basin	2,397,889	10,400,079	4.34	890,758
Lower Basin	484,110	2,337,005	4.83	150,481

Source: CORB Resource Inventory

Forest Land

Forest land in the Central Ohio River Basin covers approximately 2.37 million acres or about 33 percent of the total land area. The majority of the forest land (82 percent) lies in the southern half of the Basin, which is the unglaciated portion and includes 11 counties. The remaining 18 percent is in small, scattered tracts throughout the 12 glaciated counties.

The Oak-Hickory forest-type comprises 61 percent of the forested area, with Maple-Beech-Birch type next prevalent at 14 percent, and the Elm-Ash-Red Maple type covering 12 percent. Small pockets of Oak-Pine type (7 percent) and Pine type (6 percent) are found in the southeastern counties of the Basin.

The forests of the Central Ohio River Basin, as stated in the USDA Forest Service publication "Timber Resources of Ohio", are comprised of 33 percent sawtimber stands, 11 percent pole timber stands, 54 percent sapling and seedling stands, and 2 percent nonstocked forest area. The high percentage of sapling and seedling stands indicates that much harvesting has occurred during the past several decades, and that much forest land will be growing into merchantable sizes during the next 20 to 40 years. Under good management practices, the quality of the young timber should increase and at the same time the forests will continue to protect the soil from erosion, provide food and shelter for wildlife, and be a source of recreation for the general public (Table A.7).

Within the Central Ohio Basin there are an estimated 103,800 acres of land needing tree planting, either to reforest cut-over areas, to convert idle acres to forest land, or to fill in small openings in already forested areas.

Estimates indicate that about 162,400 acres of forest land need protection from grazing. Fencing the forests from domestic livestock prevents further impairment of forest hydrologic conditions and allows the forest floor to regain its former high quality hydrologic condition.

Table A.7 - Inventory Volume of Growing Stock Timber with Projections
Hydrologic Area, Central Ohio Rive Basin
(Millions of Cubic Feet)

	1968	1978	2000
Upper Area (12 Counties)			
Sawtimber	199.9	215.7	230.2
Poletimber	99.1	106.9	114.1
Subtotal	299.0	322.6	344.3
Lower Areas (11 Counties)			
Sawtimber	1101.9	1188.8	1268.5
Poletimber	323.9	349.5	372.9
Subtotal	1425.8	1538.3	1641.4
TOTAL	1724.8	1860.9	1985.7

Source: USDA, Forest Service - Timber Resources of Ohio, 1970 and Forest Statistics for Ohio, 1979

Timber stand improvement work is needed on approximately 1.2 million acres of forest land in the Basin. This is achieved by favoring the establishment and development of desirable species.

Range and Forest Fires

About 90 percent of the forest land in the Central Ohio River Basin lies within the fire protection area of the Ohio Department of Natural Resources. The protection boundary generally follows the boundary between the upper and lower basins. All of the lower basin is included in the area. Fire protection records kept by the state for the protected acreage show that the average number of fires per year is 452; that the average number of acres burned per year is 1,270. Fire damages to forest land and plantations amount to $11.00 per acre per year.

Management - Forest Lands

Forest management in the basin reflects the condition of the forest land. To a large extent, management decisions are based on conditions of existing stands rather than long range plans to improve or alter stand conditions. This usually means that when stands of trees reach merchantable size they are harvested and little thought is given to future stands. In the central Ohio area this usually means future stands are made up of tree species with lower economic value.

Wood for Energy

Demand for wood for fuel increased by 770 percent on the Wayne National Forest between 1976 and 1980, illustrating an increased interest in alternative energy sources. This heavy demand for fuel wood is limiting the amount of fire firewood that is easily accessible from good roads. Free permits to cut firewood are issued to individuals who intend to use the wood for personal use.

Should heavy demand develop for energy wood, both problems and opportunities would present themselves to forest land owners and operators. With high values for the new forest product and heavy demands, forest managers could encounter abusive timber cutting practices such as clear cutting on steep slopes, erodible soils, etc. However, such high values and heavy demands will probably offer the forest manager many more opportunities than problems. For example, thousands of acres of upland low grade hardwoods in the basin area could be utilized. This is not to say that all hardwoods in these areas are low grade, but the markets are presently weak for low quality and pulpwood size hardwood material. Some of the cost of timber stand improvement and site preparation could be recovered through sale of firewood. Logging residue such as tops or other material left after logging could be utilitzed. As mentioned the final impacts of harvesting energy wood from the forest will necessarily depend upon it value and the demand.

Forest Land Treatment Needs

Treatment is currently adequate on 636,500 acres (28 percent) of the total forest land in the basin. This means 1,607,200 acres are not adequately treated. The "treatments" referred to here encompass a variety of interests which include adequate protection against excessive erosion, measures to maintain or enhance productivity, adequate protection from insects and disease, and the opportunities which forest land provides to recreation and wildlife interests.

About one-sixth of the commerical forest acreage is not adequately restocking because farm animals are allowed to range unregulated through farm woods.

These animals graze or browse the tender young shoots of most broadleaf tree seedlings and saplings, effectively arresting development of the future tree crop. Larger trees in established forests also suffer growth slowdowns and damage when animals are concentrated enough to pack the soil by trampling, which reduces root aeration and soil water intake. Trampling and grazing also reduces ground cover which leads to increased overland flow and subsequent soil erosion and sedimentation of stream channels. Protection of forest land from grazing is thus one of the chief treatment needs for the commercial forests of central Ohio.

Another treatment need is planting, whether as reinforcing an inadequately stocked stand or planting an open area best suited for timber production. An increase in the number of stems by planting or by natural reproduction will ease fundamental soil and water conservation problems and contribute to future timber supplies.

One other prominent treatment need is timber stand improvement which includes such activities as thinning overstocked young forest areas and selective cutting or harvesting in older stands with the idea that both treatments will increase growth rates and quality of the remaining forest stand.

Pastureland

Pastureland covers 662,424 acres or 10 percent of the basin. About 66 percent of the pastureland is located in the lower area.

Pasture conditions range from good to poor. Unimproved pastures consist primarily of blue grass and timothy. Improved pastures may contain legumes such as red clover, tall fescue, and orchard grass. About 452,000 acres of pasture are in need of conservation treatment. This represents about 68 percent of the total pastureland. The types of treatment needed include protection from overgrazing, improvement of species, brush control, and reestablishment. All pasture needs routine treatment of lime, fertilizer, and mowing.

Agricultural Production

Production of corn for grain increased from about 56 million bushels in 1959 to 94 million bushels in 1978 (Table A.8). About 90 percent of this output came from the upper area of the basin. Soybean production also increased by a considerable amount from about 7 million bushels to over 35 million bushels in the 20 year period. Most of the production, 96 percent, occurs in the upper area. Production of hay for livestock feed has increased only slightly from 1959 to 1978 in the basin, however, the production in the upper area has decreased by about 17 percent whereas the production in the lower area has increased some 56 percent. The value of these crops and other agricultural crops amounted to 405 million dollars in 1978 -- an increase of 344 million over the 1959 value of 61 million (Table A.9).

The number of all cattle and calves has decreased some 93,000 head -- from 405,000 in 1959 to 312,000 in 1978 in the upper area. In the lower area the number of cattle and calves increased slightly from 183,000 head to 192,000 head. The number of milk cows decreased in both areas, from about 10,000 head in the upper area to 38,000 head in the lower area. However, the number of cows and calves other than milk cows increased by some 47,000 head in the lower area.

Hogs and pigs and stock sheep numbers are down substantially in both the upper and lower areas (Table A.9). The value of livestock and livestock products amounted to $234 million in 1978 -- an increase of $106 million over the 1959 value of $128 million (Table A.10).

Population

Estimated population for the Central Ohio River Basin 23-county area in 1980 was 1,771,000 (Table A.11). This represents an increase of 8.6 percent over the 1970 estimate of 1,630,000 for the basin. In the upper area, the population count in 1980 was 1,368,000, with some 70 percent of the population residing in municipalities. In the lower area, with an estimated population of 403,000, less than 40 percent live in cities or towns.

The civilian labor force in 1979 was estimated at 818,000 for the basin with some 773,000 employed. The unemployment rate was 5.1 percent in the upper area and in the lower area was 7.2 percent (Table A.11).

Average covered employment in 1979 by industry group is shown in Table A.12. Wholesale and retail trade, manufacturing, and services are the major industries in the basin accounting for about 66 percent of the employment. Total covered employment amounted to 649,000 with 557,000 or 86 percent in the upper area.

Table A.8 - Production of Major Crops by Subarea, Basin, and State for Selected Years
Central Ohio River Basin

Crop & Unit	Area	1959	1964	Years 1969	1974	1978
Corn (grain)	Upper	47,657	39,542	55,402	61,217	84,890
Bushels x 1,000	Lower	8,089	4,507	5,437	6,389	9,537
	Basin	55,746	44,049	60,839	67,606	94,427
	State	219,625	200,525	241,251	265,500	379,050
Soybeans	Upper	7,167	7,823	17,339	20,504	34,144
Bushels x 1,000	Lower	91	104	393	869	1,393
	Basin	7,258	7,927	17,732	21,373	35,537
	State	36,375	41,062	73,013	81,640	125,625
Wheat	Upper	6,409	8,830	8,060	11,053	8,849
Bushels x 1,000	Lower	415	621	592	700	549
	Basin	6,824	9,451	8,652	11,753	9,398
	State	30,968	46,272	38,646	59,450	43,875
Oats	Upper	7,601	4,537	5,006	3,362	2,223
Bushels x 1,000	Lower	585	281	340	171	88
	Basin	8,186	4,818	5,346	3,533	2,311
	State	49,500	35,860	36,270	29,450	24,400
All hay x 1,000	Upper	550	515	379	385	458
Tons, dry	Lower	218	195	215	258	340
	Basin	768	710	594	643	798
	State	3,418	3,592	2,902	3,029	3,934

Source: U.S. Department of Agriculture, Ohio Crop Reporting Service.

Table A.9 - Livestock and Poultry Inventory by Subarea, Basin and State for Selected Years
Central Ohio River Basin

Product	Area	1959	1964	1969	1974	1978
		Years				
All cattle and calves	Upper	404,600	389,200	346,500	356,300	312,500
	Lower	183,300	167,600	165,900	185,700	191,900
	Basin	587,900	556,800	512,400	542,000	504,400
	State	2,228,000	2,272,000	2,011,000	2,150,000	2,025,000
Milk cows & heifers that have calves	Upper	97,000	80,300	55,100	42,000	37,400
	Lower	57,900	44,600	28,400	20,500	20,000
	Basin	154,900	124,900	83,500	62,500	57,400
	State	773,000	670,000	499,000	412,000	398,000
Other cattle & calves	Upper	307,600	308,900	291,400	314,300	275,100
	Lower	125,400	123,000	137,500	165,200	171,900
	Basin	433,000	431,900	428,900	479,500	447,000
	State	1,455,000	1,602,000	1,512,000	1,837,000	1,627,000
All hogs and pigs	Upper	725,700	727,000	682,900	457,600	439,200
	Lower	78,000	63,500	65,800	51,400	39,000
	Basin	803,700	790,500	748,700	509,000	478,200
	State	2,603,000	2,619,000	2,557,000	1,950,000	1,900,000
Stock sheep	Upper	233,700	155,600	144,900	104,600	70,900
	Lower	38,400	27,100	21,300	14,400	9,400
	Basin	272,100	182,700	166,200	119,000	80,300
	State	973,100	669,000	617,000	441,000	310,000

Source: U.S. Department of Agriculture, Ohio Crop Reporting Service.

Table A.10 - Cash Receipts in Thousands of Dollars From Farm Marketing by Subarea, Basin, and State for Selected Years
Central Ohio River Basin

Product	Area	1959	1964	Years 1969	1974	1978
All Products Agricultural	Upper	148,399	165,486	204,496	430,656	542,168
	Lower	40,002	41,965	48,533	76,279	97,309
	Basin	188,401	207,451	253,029	506,935	639,477
	State	939,706	1,058,768	1,253,822	2,505,882	3,002,663
Crops	Upper	48,435	63,476	72,701	272,862	365,918
	Lower	12,428	13,740	14,208	33,507	39,338
	Basin	60,863	77,216	86,909	306,369	405,256
	State	361,224	431,162	483,867	1,507,509	1,730,369
Livestock & Livestock Products	Upper	99,964	102,010	131,795	157,794	176,250
	Lower	27,574	28,225	34,325	42,772	57,971
	Basin	127,538	130,235	166,120	200,566	234,221
	State	578,482	627,606	769,955	998,373	1,272,294

Source: Ohio Farm Income Series, Ohio Agricultural Research and Development Center, Wooster, Ohio.

Table A.11 - Population, 1970 and 1980 and Civilian Labor Force, 1979
Central Ohio River Basin

Item	Upper	Lower	Basin
1970			
Population, total	1,274,186	356,167	1,630,353
Municipalities	922,569	161,754	1,084,323
Others	351,617	194,413	546,030
1980			
Population, total	1,367,567	403,035	1,770,602
Municipalities	970,590	158,446	1,129,036
Others	396,977	244,589	641,566
1979			
Civilian labor farm	663,179	155,130	818,309
Employed	629,232	143,903	773,135
Unemployed	33,947	11,227	45,174

Source: Ohio County Profile, Ohio Department of Economic & Community, Office of Research.

Table A.12 - Average Covered Employment by Industry Group, 1979
Central Ohio River Basin

Item	Upper	Lower	Basin
Manufacturing	133,823	21,559	155,382
Wholesale & Retail Trade	138,172	19,491	157,663
Services	101,570	12,271	113,841
Contract Construction	23,913	4,067	27,980
Transportation, Public Utilities, & Communication	23,921	5,913	31,834
Finance, Insurance and Real Estate	37,087	3,110	40,197
State and Local Government	92,560	21,257	113,817
Agriculture, Forestry & Fisheries	2,831	596	3,427
Mining	1,079	3,798	4,877
Unallocated	101	144	245
TOTAL	557,057	92,206	649,263

Source: Ohio County Profile, Ohio Department of Economic & Community Development, Office of Research.

APPENDIX B

Tables B.1 and B.2 compare the effects of different crop management systems by soil resources groups (SRG) within the upper and lower basins, respectively. Erosion losses, production values, and production costs are included in the comparisons.

The crop management systems evaluated include five different rotations with four different tillage systems. The crops within the rotations include row crops (R), small grain (G), and hay or meadow (M). The tillage systems are fall plow, spring plow, chisel disc, and no-till. The practice of contour farming (Cont.) was also evaluated for the SRGs where the practice is applicable.

The effect of these crop management systems on soil loss for the average soil and slope characteristics within the SRG was computed. The soil loss was compared with the average (T) value and an "X" was placed in either the "Under T" column or the "Over T" column. The average "T" values of all soils within the SRGs were used in order to compute net effects of treatment on the basin level.

"The Net Return Per Acre" column contains the economic return to the farmer based on 1980 normalized costs and prices and long term (year 2000) expected yields. Fixed costs were not included in the evaluation.

All of the crop management systems were then compared with the most erodable system (RRR Fall Plow). The amount of soil saved was entered along with the change in net return per acre and per ton of soil saved.

The use of Tables B.1 and B.2 allows land users to make crop management decisions on a rational economic basis by comparing net returns per acre on those rotations which conserve the resource base.

Table B.1

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	B	ALGIERS	MEDWAY	ROSS
CLASS	IIW	EEL	ORRVILLE	SHOALS
SLOPE	A	GENESEE	PHILO	STONELICK
T-VALUE	4.8	LOBDELL	POPE	

CROP MANAGEMENT SYSTEM ROTATION	TILLAGE SYSTEM	EROSION CONTROL UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW: SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW	X		3.36	176.79	0.00	0.00	I
RRRG	FALL PLOW	X		2.34	140.64	1.02	-36.15	-35.61
RRG	FALL PLOW	X		2.03	128.56	1.33	-48.23	-36.33
RRGM	FALL PLOW	X		1.33	115.26	2.03	-61.52	-30.31
RRGMM	FALL PLOW	X		1.09	119.26	2.26	-57.53	-25.41
RRR	SPRING PLOW	X		2.97	176.86	.39	.07	.18
RRRG	SPRING PLOW	X		2.03	140.70	1.33	-36.09	-27.19
RRG	SPRING PLOW	X		1.80	128.61	1.56	-48.18	-30.85
RRGM	SPRING PLOW	X		1.09	115.27	2.26	-61.52	-27.17
RRGMM	SPRING PLOW	X		.86	119.29	2.50	-57.50	-23.01
RRR	CHISEL DISC	X		1.00	189.38	2.36	12.60	5.34
RRRG	CHISEL DISC	X		.87	150.35	2.48	-26.44	-10.65
RRG	CHISEL DISC	X		.84	137.17	2.52	-39.61	-15.71
RRGM	CHISEL DISC	X		.64	121.69	2.72	-55.09	-20.28
RRGMM	CHISEL DISC	X		.52	124.44	2.84	-52.35	-18.42
RRR	NO TIL	X		.55	154.15	2.81	-22.63	-8.05
RRRG	NO TIL	X		.45	123.69	2.91	-53.09	-18.23
RRG	NO TIL	X		.42	113.49	2.94	-63.29	-21.56
RRGM	NO TIL	X		.33	103.94	3.03	-72.85	-24.05
RRGMM	NO TIL	X		.31	110.21	3.05	-66.57	-21.86

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG C SLOAN
CLASS IIIW
SLOPE A
T-VALUE 5.0

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW	X		3.07	131.23	0.00	0.00	I
RRRG	FALL PLOW	X		2.14	103.18	.93	-28.05	-30.21
RRG	FALL PLOW	X		1.86	93.43	1.21	-37.79	-31.13
RRGMM	FALL PLOW	X		1.00	98.25	2.07	-32.97	-15.92
RRR	SPRING PLOW	X		2.71	131.25	.36	.03	.07
RRRG	SPRING PLOW	X		1.86	103.09	1.21	-28.13	-23.18
RRG	SPRING PLOW	X		1.64	93.81	1.43	-37.41	-26.20
RRGMM	SPRING PLOW	X		.79	98.29	2.28	-32.94	-14.42
RRR	CHISEL DISC	X		.91	130.02	2.16	-1.21	-.56
RRRG	CHISEL DISC	X		.80	102.25	2.27	-28.98	-12.76
RRG	CHISEL DISC	X		.76	92.76	2.31	-38.47	-16.68
RRGMM	CHISEL DISC	X		.47	97.76	2.60	-33.47	-12.88
RRR	NO TIL	X		.50	125.10	2.57	-6.13	-2.38
RRRG	NO TIL	X		.41	98.52	2.66	-32.70	-12.28
RRG	NO TIL	X		.39	89.56	2.68	-41.67	-15.52
RRGMM	NO TIL	X		.29	95.81	2.78	-35.41	-12.72

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG D CARLISLE
CLASS IIIW
SLOPE A
T-VALUE 0.0

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	CHISEL DISC	X		0.00	131.61	NA	NA	NA
RRRG	CHISEL DISC	X		0.00	105.66	NA	NA	NA

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	E	CARDINGTON	MARKLAND	THACKERY
CLASS	I-	CELINA	MIAMIAN	TIPPECANOE
SLOPE	A	DANA	OCKLEY	UNIONTOWN
T-VALUE	4.4	KENDALLVILLE	PIKE	WEA

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW	X		3.90	188.73	0.00	0.00	I
RRRG	FALL PLOW	X		2.72	150.66	1.18	-38.07	-32.26
RRG	FALL PLOW	X		2.36	137.90	1.54	-50.83	-32.94
RRGM	FALL PLOW	X		1.54	122.27	2.36	-66.46	-28.16
RRGMM	FALL PLOW	X		1.27	124.87	2.63	-63.86	-24.26
RRR	SPRING PLOW	X		3.45	188.74	.45	.01	.02
RRRG	SPRING PLOW	X		2.36	150.66	1.54	-38.07	-24.67
RRG	SPRING PLOW	X		2.09	137.87	1.82	-50.86	-28.01
RRGM	SPRING PLOW	X		1.27	122.27	2.63	-66.46	-25.24
RRGMM	SPRING PLOW	X		1.00	124.87	2.90	-63.86	-21.98
RRR	CHISEL DISC	X		1.16	195.30	2.74	6.57	2.40
RRRG	CHISEL DISC	X		1.02	155.69	2.89	-33.04	-11.44
RRG	CHISEL DISC	X		.97	142.36	2.93	-46.38	-15.82
RRGM	CHISEL DISC	X		.74	125.61	3.16	-63.12	-19.98
RRGMM	CHISEL DISC	X		.60	127.56	3.30	-61.17	-18.51
RRR	NO TIL	X		.64	187.42	3.27	-1.31	-.40
RRRG	NO TIL	X		.52	149.70	3.39	-39.03	-11.53
RRG	NO TIL	X		.49	137.02	3.41	-51.71	-15.15
RRGM	NO TIL	X		.38	121.62	3.52	-67.11	-19.05
RRGMM	NO TIL	X		.36	124.35	3.54	-64.38	-18.19

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG F ELDEAN (FOX)
CLASS IIS MILTON
SLOPE A WARSAW
T-VALUE 3.7

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW	X		3.25	156.42	0.00	0.00	I
RRRG	FALL PLOW	X		2.26	125.36	.98	-31.06	-31.66
RRG	FALL PLOW	X		1.96	115.00	1.28	-41.42	-32.28
RRGM	FALL PLOW	X		1.28	103.42	1.96	-53.00	-27.01
RRGMM	FALL PLOW	X		1.06	107.59	2.19	-48.83	-22.31
RRR	SPRING PLOW	X		2.87	156.71	.38	.29	.77
RRRG	SPRING PLOW	X		1.96	125.58	1.28	-30.83	-24.03
RRG	SPRING PLOW	X		1.74	115.08	1.51	-41.34	-27.39
RRGM	SPRING PLOW	X		1.06	103.57	2.19	-52.84	-24.15
RRGMM	SPRING PLOW	X		.83	107.70	2.41	-48.72	-20.17
RRR	CHISEL DISC	X		.97	162.18	2.28	5.76	2.53
RRRG	CHISEL DISC	X		.85	129.13	2.40	-27.28	-11.37
RRG	CHISEL DISC	X		.81	118.39	2.44	-38.03	-15.60
RRGM	CHISEL DISC	X		.62	105.93	2.63	-50.49	-19.22
RRGMM	CHISEL DISC	X		.50	109.59	2.75	-46.83	-17.05
RRR	NO TIL	X		.53	190.12	2.72	33.70	12.41
RRRG	NO TIL	X		.43	150.64	2.81	-5.77	-2.05
RRG	NO TIL	X		.41	137.43	2.84	-18.99	-6.69
RRGM	NO TIL	X		.32	120.26	2.93	-36.16	-12.35
RRGMM	NO TIL	X		.30	121.06	2.94	-35.35	-12.01

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	G	ALEXANDRIA	HANOVER	MARKLAND	OCKLEY	SARDINA
CLASS	IIE	CARDINGTON	HAUBSTADT	MENTOR	OTWELL	THACKERY
SLOPE	B	CELINA	KENDALLVILLE	MIAMIAN	PIKE	WEA
T-VALUE	4.5	CORWIN	LEWISBURG	MONONGAHELA	RITTMAN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	9.71	120.98	0.00	0.00	I
RRRG	FALL PLOW		X	6.78	97.28	2.94	-23.70	-8.07
RRRG	FALL PLOW CONT	X		3.39	117.47	6.32	-3.52	-.56
RRG	FALL PLOW		X	5.87	89.64	3.84	-31.35	-8.16
RRG	FALL PLOW CONT	X		2.94	108.27	6.78	-12.72	-1.88
RRGM	FALL PLOW	X		3.84	105.02	5.87	-15.96	-2.72
RRGM	FALL PLOW CONT	X		1.92	97.70	7.79	-23.29	-2.99
RRGMM	FALL PLOW	X		3.16	108.80	6.55	-12.18	-1.86
RRGMM	FALL PLOW CONT	X		1.58	102.92	8.13	-18.06	-2.22
RRR	SPRING PLOW		X	8.58	131.46	1.13	10.48	9.28
RRR	SPRING PLOW CONT	X		4.29	144.86	5.42	23.88	4.41
RRRG	SPRING PLOW		X	5.87	105.05	3.84	-15.94	-4.15
RRRG	SPRING PLOW CONT	X		2.94	117.42	6.78	-3.56	-.53
RRG	SPRING PLOW		X	5.20	96.48	4.52	-24.50	-5.42
RRG	SPRING PLOW CONT	X		2.60	108.18	7.12	-12.80	-1.80
RRGM	SPRING PLOW	X		3.16	105.02	6.55	-15.96	-2.44
RRGM	SPRING PLOW CONT	X		1.58	97.69	8.13	-23.30	-2.86
RRGMM	SPRING PLOW	X		2.48	108.80	7.23	-12.18	-1.69
RRGMM	SPRING PLOW CONT	X		1.24	102.93	8.47	-18.06	-2.13
RRR	CHISEL DISC	X		2.89	182.69	6.82	61.71	9.05
RRRG	CHISEL DISC	X		2.53	146.04	7.18	25.06	3.49
RRG	CHISEL DISC	X		2.42	133.68	7.30	12.70	1.74
RRGM	CHISEL DISC	X		1.85	116.57	7.86	-4.41	-.56
RRGMM	CHISEL DISC	X		1.49	118.04	8.22	-2.95	-.36
RRR	NO TIL	X		1.58	212.35	8.13	91.36	11.24
RRRG	NO TIL	X		1.29	168.51	8.43	47.53	5.64
RRG	NO TIL	X		1.22	153.72	8.49	32.73	3.85
RRGM	NO TIL	X		.95	131.42	8.76	10.43	1.19
RRGMM	NO TIL	X		.90	129.91	8.81	8.93	1.01

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	H	BOSTON	TRAPPIST
CLASS	IIE	ELDEAN (FOX)	WARSAW
SLOPE	B	HANEY	
T-VALUE	3.6	LOUDON	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	10.89	115.49	0.00	0.00	I
RRRG	FALL PLOW		X	7.60	93.88	3.29	-21.61	-6.56
RRG	FALL PLOW		X	6.59	86.33	4.31	-29.16	-6.77
RRG	FALL PLOW CONT	X		3.29	93.05	7.60	-22.44	-2.95
RRGM	FALL PLOW		X	4.31	81.91	6.59	-33.57	-5.10
RRGM	FALL PLOW CONT	X		2.15	87.69	8.74	-27.80	-3.18
RRGMM	FALL PLOW	X		3.55	100.44	7.35	-15.05	-2.05
RRGMM	FALL PLOW CONT	X		1.77	94.78	9.12	-20.70	-2.27
RRR	SPRING PLOW		X	9.63	115.49	1.27	.00	.00
RRRG	SPRING PLOW		X	6.59	93.87	4.31	-21.62	-5.02
RRRG	SPRING PLOW CONT	X		3.29	100.90	7.60	-14.58	-1.92
RRG	SPRING PLOW		X	5.83	86.39	5.07	-29.09	-5.74
RRG	SPRING PLOW CONT	X		2.91	93.22	7.98	-22.26	-2.79
RRGM	SPRING PLOW	X		3.55	94.69	7.35	-20.79	-2.83
RRGM	SPRING PLOW CONT	X		1.77	87.21	9.12	-28.28	-3.10
RRGMM	SPRING PLOW	X		2.79	100.44	8.11	-15.04	-1.86
RRGMM	SPRING PLOW CONT	X		1.39	94.78	9.50	-20.70	-2.18
RRR	CHISEL DISC	X		3.24	161.42	7.65	45.93	6.00
RRRG	CHISEL DISC	X		2.84	128.48	8.06	13.00	1.61
RRG	CHISEL DISC	X		2.71	117.67	8.18	2.19	.27
RRGM	CHISEL DISC	X		2.08	105.46	8.82	-10.03	-1.14
RRGMM	CHISEL DISC	X		1.67	109.04	9.22	-6.45	-.70
RRR	NO TIL	X		1.77	179.11	9.12	63.63	6.98
RRRG	NO TIL	X		1.44	141.76	9.45	26.28	2.78
RRG	NO TIL	X		1.37	129.49	9.53	14.00	1.47
RRGM	NO TIL	X		1.06	114.33	9.83	-1.15	-.12
RRGMM	NO TIL	X		1.01	116.11	9.88	.63	.06

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	I	BRATTON	MILTON	ST. CLAIR
CLASS	IIE	CINCINNATI	MORLEY	
SLOPE	B	COOLVILLE	NICHOLSON	
T-VALUE	3.1	GLYNWOOD	ROSSMOYNE	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	10.79	111.34	0.00	0.00	I
RRRG	FALL PLOW		X	7.53	91.56	3.26	-19.78	-6.06
RRG	FALL PLOW		X	6.52	84.03	4.27	-27.31	-6.40
RRGM	FALL PLOW		X	4.27	79.32	6.52	-32.02	-4.91
RRGM	FALL PLOW CONT	X		2.13	93.23	8.66	-18.11	-2.09
RRGMM	FALL PLOW		X	3.51	88.66	7.28	-22.68	-3.12
RRGMM	FALL PLOW CONT	X		1.76	98.98	9.03	-12.36	-1.37
RRR	SPRING PLOW		X	9.53	117.45	1.25	6.11	4.87
RRRG	SPRING PLOW		X	6.52	96.17	4.27	-15.17	-3.56
RRG	SPRING PLOW		X	5.77	88.15	5.02	-23.18	-4.62
RRG	SPRING PLOW CONT	X		2.89	100.87	7.90	-10.47	-1.32
RRGM	SPRING PLOW		X	3.51	82.29	7.28	-29.05	-3.99
RRGM	SPRING PLOW CONT	X		1.76	93.38	9.03	-17.96	-1.99
RRGMM	SPRING PLOW	X		2.76	105.73	8.03	-5.60	-.70
RRGMM	SPRING PLOW CONT	X		1.38	99.10	9.41	-12.24	-1.30
RRR	CHISEL DISC		X	3.21	135.48	7.58	24.14	3.19
RRRG	CHISEL DISC	X		2.81	141.02	7.98	29.68	3.72
RRG	CHISEL DISC	X		2.68	129.58	8.10	18.24	2.25
RRGM	CHISEL DISC	X		2.06	115.19	8.73	3.85	.44
RRGMM	CHISEL DISC	X		1.66	116.36	9.13	5.02	.55
RRR	NO TIL	X		1.76	177.68	9.03	66.34	7.34
RRRG	NO TIL	X		1.43	141.30	9.36	29.96	3.20
RRG	NO TIL	X		1.35	129.86	9.43	18.52	1.96
RRGM	NO TIL	X		1.05	115.39	9.73	4.05	.42
RRGMM	NO TIL	X		1.00	116.52	9.79	5.18	.53

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	J	CROSBY	SLEETH
CLASS	IIW	HAURSTADT	
SLOPE	A	ODELL	
T-VALUE	3.1	RITTMAN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	4.30	138.89	0.00	0.00	I
RRR	FALL PLOW CONT	X		2.58	159.45	1.72	20.56	11.95
RRRG	FALL PLOW	X		3.00	140.87	1.30	1.98	1.53
RRRG	FALL PLOW CONT	X		1.80	130.44	2.50	-8.45	-3.38
RRG	FALL PLOW	X		2.60	128.33	1.70	-10.55	-6.21
RRG	FALL PLOW CONT	X		1.56	118.35	2.74	-20.54	-7.50
RRGM	FALL PLOW	X		1.70	115.04	2.60	-23.85	-9.17
RRGM	FALL PLOW CONT	X		1.02	108.01	3.28	-30.87	-9.41
RRGMM	FALL PLOW	X		1.40	119.13	2.90	-19.75	-6.81
RRGMM	FALL PLOW CONT	X		.84	113.59	3.46	-25.29	-7.31
RRR	SPRING PLOW		X	3.80	146.26	.50	7.37	14.74
RRR	SPRING PLOW CONT	X		2.28	160.05	2.02	21.16	10.48
RRRG	SPRING PLOW	X		2.60	141.12	1.70	2.24	1.32
RRRG	SPRING PLOW CONT	X		1.56	130.45	2.74	-8.44	-3.08
RRG	SPRING PLOW	X		2.30	128.47	2.00	-10.42	-5.21
RRG	SPRING PLOW CONT	X		1.38	118.69	2.92	-20.19	-6.92
RRGM	SPRING PLOW	X		1.40	115.25	2.90	-23.64	-8.15
RRGM	SPRING PLOW CONT	X		.84	108.49	3.46	-30.39	-8.78
RRGMM	SPRING PLOW	X		1.10	119.24	3.20	-19.65	-6.14
RRGMM	SPRING PLOW CONT	X		.66	113.86	3.64	-25.03	-6.88
RRR	CHISEL DISC	X		1.28	188.21	3.02	49.32	16.33
RRRG	CHISEL DISC	X		1.12	143.89	3.18	5.00	1.57
RRG	CHISEL DISC	X		1.07	130.96	3.23	-7.93	-2.45
RRGM	CHISEL DISC	X		.82	117.06	3.48	-21.83	-6.27
RRGMM	CHISEL DISC	X		.66	120.72	3.64	-18.17	-4.99
RRR	NO TIL	X		.70	149.99	3.60	11.10	3.08
RRRG	NO TIL	X		.57	119.59	3.73	-19.30	-5.17
RRG	NO TIL	X		.54	109.36	3.76	-29.53	-7.85
RRGM	NO TIL	X		.42	100.84	3.88	-38.05	-9.81
RRGMM	NO TIL	X		.40	107.70	3.90	-31.18	-8.00

Table B.1 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	K	AVONBURG	DUBOIS
CLASS	IIW	BENNINGTON	ROSSMOYNE
SLOPE	A	BLOUNT	
T-VALUE	3.0	DIGBY	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	4.05	120.46	0.00	0.00	I
RRR	FALL PLOW CONT	X		2.43	146.04	1.62	25.57	15.79
RRRG	FALL PLOW	X		2.82	124.96	1.22	4.50	3.68
RRRG	FALL PLOW CONT	X		1.69	116.17	2.35	-4.29	-1.82
RRG	FALL PLOW	X		2.45	113.97	1.60	-6.50	-4.06
RRG	FALL PLOW CONT	X		1.47	106.26	2.58	-14.21	-5.51
RRGM	FALL PLOW	X		1.60	102.72	2.45	-17.74	-7.25
RRGM	FALL PLOW CONT	X		.96	96.85	3.09	-23.62	-7.65
RRGMM	FALL PLOW	X		1.32	107.02	2.73	-13.45	-4.92
RRGMM	FALL PLOW CONT	X		.79	102.27	3.26	-18.20	-5.59
RRR	SPRING PLOW		X	3.58	135.14	.47	14.68	31.18
RRR	SPRING PLOW CONT	X		2.15	146.06	1.90	25.59	13.46
RRRG	SPRING PLOW	X		2.45	125.14	1.60	4.67	2.92
RRRG	SPRING PLOW CONT	X		1.47	116.13	2.58	-4.33	-1.68
RRG	SPRING PLOW	X		2.17	114.18	1.88	-6.29	-3.34
RRG	SPRING PLOW CONT	X		1.30	106.12	2.75	-14.34	-5.22
RRGM	SPRING PLOW	X		1.32	102.86	2.73	-17.61	-6.45
RRGM	SPRING PLOW CONT	X		.79	96.74	3.26	-23.73	-7.28
RRGMM	SPRING PLOW	X		1.04	107.12	3.01	-13.35	-4.43
RRGMM	SPRING PLOW CONT	X		.62	102.29	3.43	-18.17	-5.30
RRR	CHISEL DISC	X		1.21	165.17	2.84	44.71	15.72
RRRG	CHISEL DISC	X		1.05	129.84	2.99	9.37	3.13
RRG	CHISEL DISC	X		1.01	118.35	3.04	-2.12	-.70
RRGM	CHISEL DISC	X		.77	105.97	3.28	-14.50	-4.42
RRGMM	CHISEL DISC	X		.62	109.60	3.43	-10.86	-3.17
RRR	NO TIL	X		.66	134.81	3.39	14.34	4.23
RRRG	NO TIL	X		.54	107.80	3.51	-12.67	-3.61
RRG	NO TIL	X		.51	98.73	3.54	-21.73	-6.14
RRGM	NO TIL	X		.40	91.27	3.65	-29.19	-7.99
RRGMM	NO TIL	X		.38	97.86	3.67	-22.60	-6.16

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	L	BENNINGTON	ODELL
CLASS	IIE(W)	BLOUNT	
SLOPE	B	CROSBY	
T-VALUE	3.0	MC GARY	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	8.95	113.26	0.00	0.00	I
RRRG	FALL PLOW		X	6.24	90.10	2.71	-23.16	-8.56
RRG	FALL PLOW		X	5.41	81.82	3.54	-31.44	-8.88
RRG	FALL PLOW CONT	X		2.71	91.42	6.24	-21.84	-3.50
RRGM	FALL PLOW		X	3.54	78.47	5.41	-34.79	-6.43
RRGM	FALL PLOW CONT	X		1.77	85.66	7.18	-27.60	-3.84
RRGMM	FALL PLOW	X		2.91	101.55	6.04	-11.71	-1.94
RRGMM	FALL PLOW CONT	X		1.46	93.16	7.49	-20.10	-2.68
RRR	SPRING PLOW		X	7.91	123.09	1.04	9.83	9.45
RRRG	SPRING PLOW		X	5.41	97.76	3.54	-15.50	-4.38
RRRG	SPRING PLOW CONT	X		2.71	99.71	6.24	-13.55	-2.17
RRG	SPRING PLOW		X	4.79	88.28	4.16	-24.98	-6.00
RRG	SPRING PLOW CONT	X		2.39	91.47	6.56	-21.79	-3.32
RRGM	SPRING PLOW	X		2.91	96.25	6.04	-17.01	-2.82
RRGM	SPRING PLOW CONT	X		1.46	85.67	7.49	-27.59	-3.68
RRGMM	SPRING PLOW	X		2.29	101.56	6.66	-11.70	-1.76
RRGMM	SPRING PLOW CONT	X		1.14	93.13	7.81	-20.13	-2.58
RRR	CHISEL DISC	X		2.66	149.83	6.29	36.57	5.82
RRRG	CHISEL DISC	X		2.33	119.18	6.62	5.92	.89
RRG	CHISEL DISC	X		2.23	108.87	6.72	-4.39	-.65
RRGM	CHISEL DISC	X		1.71	98.72	7.24	-14.54	-2.01
RRGMM	CHISEL DISC	X		1.37	103.52	7.58	-9.74	-1.29
RRR	NO TIL	X		1.46	134.81	7.49	21.55	2.88
RRRG	NO TIL	X		1.19	106.93	7.76	-6.33	-.81
RRG	NO TIL	X		1.12	97.92	7.83	-15.34	-1.96
RRGM	NO TIL	X		.87	90.53	8.08	-22.73	-2.81
RRGMM	NO TIL	X		.83	97.01	8.12	-16.25	-2.00

Table B.1 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	M	BLANCHESTER	LIPPINCOTT	PEWAMO
CLASS	IIW	BONPAS	MARENGO	WESTLAND
SLOPE	A	BROOKSTON	MILLGROVE	WETZEL
T-VALUE	4.3	KOKOMO	PATTON	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW	X		2.22	184.35	0.00	0.00	I
RRRG	FALL PLOW	X		1.55	147.23	.67	-37.12	-55.28
RRG	FALL PLOW	X		1.34	134.44	.88	-49.92	-56.85
RRGM	FALL PLOW	X		.88	119.67	1.34	-64.68	-48.17
RRGMM	FALL PLOW	X		.72	122.78	1.50	-61.57	-41.11
RRR	SPRING PLOW	X		1.96	180.82	.26	-3.53	-13.68
RRRG	SPRING PLOW	X		1.34	144.80	.88	-39.55	-45.05
RRG	SPRING PLOW	X		1.19	132.31	1.03	-52.05	-50.39
RRGM	SPRING PLOW	X		.72	118.05	1.50	-66.30	-44.27
RRGMM	SPRING PLOW	X		.57	121.52	1.65	-62.83	-38.01
RRR	CHISEL DISC	X		.66	190.96	1.56	6.61	4.24
RRRG	CHISEL DISC	X		.58	148.27	1.64	-36.08	-21.97
RRG	CHISEL DISC	X		.55	135.37	1.67	-48.98	-29.36
RRGM	CHISEL DISC	X		.42	120.37	1.80	-63.99	-35.60
RRGMM	CHISEL DISC	X		.34	123.34	1.88	-61.01	-32.45
RRR	NO TIL	X		.36	143.08	1.86	-41.27	-22.20
RRRG	NO TIL	X		.29	115.36	1.93	-69.00	-35.81
RRG	NO TIL	X		.28	106.09	1.94	-78.27	-40.30
RRGM	NO TIL	X		.22	98.41	2.00	-85.95	-42.89
RRGMM	NO TIL	X		.21	105.79	2.01	-78.56	-39.00

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	N	ALEXANDRIA	HAUBSTADT	OTWELL
CLASS	IIIE	CANA	KENDALLVILLE	PIKE
SLOPE	C	CARDINGTON	MIAMIAN	RITTMAN
T-VALUE	4.3	HANOVER	OCKLEY	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	28.19	102.16	0.00	0.00	I
RRRG	FALL PLOW		X	19.67	82.09	8.52	-20.06	-2.35
RRG	FALL PLOW		X	17.04	75.22	11.14	-26.93	-2.42
RRGM	FALL PLOW		X	11.14	71.49	17.04	-30.67	-1.80
RRGMM	FALL PLOW		X	9.18	81.45	19.01	-20.70	-1.09
RRR	SPRING PLOW		X	24.91	109.79	3.28	7.64	2.33
RRRG	SPRING PLOW		X	17.04	87.71	11.14	-14.44	-1.30
RRG	SPRING PLOW		X	15.08	80.23	13.11	-21.93	-1.67
RRGM	SPRING PLOW		X	9.18	75.18	19.01	-26.98	-1.42
RRGMM	SPRING PLOW		X	7.21	84.40	20.98	-17.75	-.85
RRR	CHISEL DISC		X	8.39	123.64	19.80	21.49	1.09
RRRG	CHISEL DISC		X	7.34	97.46	20.85	-4.70	-.23
RRG	CHISEL DISC		X	7.01	88.78	21.17	-13.38	-.63
RRGM	CHISEL DISC		X	5.38	81.91	22.81	-20.25	-.89
RRGMM	CHISEL DISC		X	4.33	89.78	23.86	-12.37	-.52
RRR	NO TIL		X	4.59	131.97	23.60	29.82	1.26
RRRG	NO TIL	X		3.74	117.84	24.45	15.68	.64
RRG	NO TIL	X		3.54	106.92	24.65	4.76	.19
RRGM	NO TIL	X		2.75	95.28	25.44	-6.87	-.27
RRGMM	NO TIL	X		2.62	100.49	25.57	-1.66	-.07

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	0	BOSTON	TRAPPIST
CLASS	IIIE	ELDEAN (FOX)	WELLSTON
SLOPE	C	LOUDON	
T-VALUE	3.3	RODMAN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	33.05	85.04	0.00	0.00	I
RRG	FALL PLOW		X	19.98	63.39	13.07	-21.65	-1.66
RRGM	FALL PLOW		X	13.07	62.47	19.98	-22.56	-1.13
RRGMM	FALL PLOW		X	10.76	74.25	22.29	-10.79	-.48
RRR	SPRING PLOW		X	29.21	85.03	3.84	-.01	-.00
RRG	SPRING PLOW		X	17.68	63.27	15.37	-21.77	-1.42
RRGM	SPRING PLOW		X	10.76	62.47	22.29	-22.56	-1.01
RRGMM	SPRING PLOW		X	8.45	74.24	24.60	-10.80	-.44
RRR	CHISEL DISC		X	9.84	96.79	23.21	11.76	.51
RRG	CHISEL DISC		X	8.22	71.11	24.83	-13.93	-.56
RRGM	CHISEL DISC		X	6.30	68.35	26.75	-16.69	-.62
RRGMM	CHISEL DISC		X	5.07	78.94	27.98	-6.09	-.22
RRR	NO TIL		X	5.38	111.25	27.67	26.21	.95
RRG	NO TIL		X	4.15	80.76	28.90	-4.27	-.15
RRGM	NO TIL	X		3.23	88.77	29.82	3.73	.13
RRGMM	NO TIL	X		3.07	95.27	29.98	10.23	.34

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	P	BRATTON	MORLEY
CLASS	IIIE	CINCINNATI	NEGLEY
SLOPE	C	GLYNWOOD	RARDEN
T-VALUE	3.2	HICKORY	ROSSMOYNE

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	27.31	91.94	0.00	0.00	I
RRRG	FALL PLOW		X	19.06	74.26	8.26	-17.68	-2.14
RRG	FALL PLOW		X	16.51	68.37	10.80	-23.58	-2.18
RRGM	FALL PLOW		X	10.80	66.27	16.51	-25.68	-1.55
RRGMM	FALL PLOW		X	8.89	77.27	18.42	-14.67	-.80
RRR	SPRING PLOW		X	24.14	103.63	3.18	11.69	3.68
RRRG	SPRING PLOW		X	16.51	82.47	10.80	-9.47	-.88
RRG	SPRING PLOW		X	14.61	75.47	12.70	-16.48	-1.30
RRGM	SPRING PLOW		X	8.89	71.98	18.42	-19.96	-1.08
RRGMM	SPRING PLOW		X	6.99	81.84	20.33	-10.11	-.50
RRR	CHISEL DISC		X	8.13	116.43	19.18	24.48	1.28
RRRG	CHISEL DISC		X	7.11	92.58	20.20	.63	.03
RRG	CHISEL DISC		X	6.80	84.61	20.52	-7.33	-.36
RRGM	CHISEL DISC		X	5.21	78.50	22.10	-13.45	-.61
RRGMM	CHISEL DISC		X	4.19	87.06	23.12	-4.89	-.21
RRR	NO TIL		X	4.45	130.63	22.87	38.69	1.69
RRRG	NO TIL		X	3.62	103.30	23.69	11.35	.48
RRG	NO TIL		X	3.43	94.19	23.88	2.25	.09
RRGM	NO TIL	X		2.67	89.10	24.65	-2.84	-.12
RRGMM	NO TIL	X		2.54	95.54	24.77	3.59	.15

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG Q MC GARY
CLASS IIIW
SLOPE A
T-VALUE 2.9

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	4.80	121.98	0.00	0.00	I
RRRG	FALL PLOW		X	3.35	96.04	1.45	-25.94	-17.88
RRG	FALL PLOW		X	2.90	87.81	1.90	-34.17	-18.01
RRGMM	FALL PLOW	X		1.56	98.93	3.24	-23.05	-7.12
RRR	SPRING PLOW		X	4.24	131.99	.56	10.01	17.94
RRRG	SPRING PLOW		X	2.90	103.48	1.90	-18.50	-9.75
RRG	SPRING PLOW	X		2.57	110.98	2.23	-11.00	-4.93
RRGMM	SPRING PLOW	X		1.23	98.93	3.57	-23.05	-6.46
RRR	CHISEL DISC	X		1.43	161.64	3.37	39.66	11.77
RRRG	CHISEL DISC	X		1.25	125.50	3.55	3.52	.99
RRG	CHISEL DISC	X		1.19	114.04	3.60	-7.94	-2.20
RRGMM	CHISEL DISC	X		.74	100.78	4.06	-21.20	-5.22

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	R	CLERMONT	WADSWORTH
CLASS	IIIW	CONDIT	
SLOPE	A	FULTON	
T-VALUE	4.1	NAPPANEE	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW	X		3.22	128.69	0.00	0.00	I
RRRG	FALL PLOW	X		2.25	101.57	.97	-27.12	-27.86
RRG	FALL PLOW	X		1.95	91.30	1.27	-37.40	-29.38
RRGM	FALL PLOW	X		1.27	82.02	1.95	-46.68	-23.98
RRGMM	FALL PLOW	X		1.05	87.59	2.17	-41.10	-18.93
RRR	SPRING PLOW	X		2.85	128.78	.37	.09	.23
RRRG	SPRING PLOW	X		1.95	102.11	1.27	-26.59	-20.89
RRGM	SPRING PLOW	X		1.05	81.77	2.17	-46.92	-21.61
RRGMM	SPRING PLOW	X		.82	87.34	2.40	-41.36	-17.26
RRR	CHISEL DISC	X		.96	130.81	2.26	2.12	.94
RRRG	CHISEL DISC	X		.84	103.46	2.38	-25.24	-10.60
RRG	CHISEL DISC	X		.80	93.24	2.42	-35.46	-14.66
RRGM	CHISEL DISC	X		.61	83.54	2.61	-45.15	-17.33
RRGMM	CHISEL DISC	X		.49	88.55	2.73	-40.14	-14.73

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	S	ALTAS	WADSWORTH
CLASS	IIIE(W)	AVONBURG	
SLOPE	B	BARTLE	
T-VALUE	3.1	NAPPANEE	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	10.79	92.35	0.00	0.00	I
RRRG	FALL PLOW		X	7.53	74.87	3.26	-17.48	-5.36
RRGM	FALL PLOW		X	4.27	64.67	6.52	-27.68	-4.24
RRGMM	FALL PLOW		X	3.51	73.28	7.28	-19.07	-2.62
RRR	SPRING PLOW		X	9.53	93.74	1.25	1.39	1.11
RRRG	SPRING PLOW		X	6.52	75.24	4.27	-17.11	-4.01
RRGM	SPRING PLOW		X	3.51	65.64	7.28	-26.71	-3.67
RRGMM	SPRING PLOW	X		2.76	85.37	8.03	-6.98	-.87
RRR	CHISEL DISC		X	3.21	112.98	7.58	20.63	2.72
RRRG	CHISEL DISC	X		2.81	97.56	7.98	5.21	.65
RRGM	CHISEL DISC	X		2.06	79.78	8.73	-12.57	-1.44
RRGMM	CHISEL DISC	X		1.66	85.39	9.13	-6.96	-.76

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	T	MILLDSALE
CLASS	IIIW	MONTGOMERY
SLOPE	A	PAULDING
T-VALUE	4.8	TOLEDO

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW	X		2.48	171.29	0.00	0.00	I
RRRG	FALL PLOW	X		1.73	134.13	.75	-37.16	-49.57
RRGM	FALL PLOW	X		.98	110.01	1.50	-61.28	-40.88
RRGMM	FALL PLOW	X		.81	115.13	1.67	-56.16	-33.59
RRR	SPRING PLOW	X		2.19	150.67	.29	-20.62	-71.51
RRRG	SPRING PLOW	X		1.50	118.89	.98	-52.40	-53.45
RRGM	SPRING PLOW	X		.81	99.90	1.67	-71.38	-42.69
RRGMM	SPRING PLOW	X		.63	107.07	1.85	-64.22	-34.80
RRR	CHISEL DISC	X		.74	162.67	1.74	-8.61	-4.95
RRRG	CHISEL DISC	X		.65	126.43	1.83	-44.86	-24.46
RRGM	CHISEL DISC	X		.47	104.88	2.01	-66.41	-33.10
RRGMM	CHISEL DISC	X		.38	110.97	2.10	-60.31	-28.74

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	U	ALEXANDRIA	KENDALLVILLE	OTWELL
CLASS	IVE	CANA	LOUDONVILLE	PARKE
SLOPE	D	HANOVER	MENTOR	
T-VALUE	4.0	HAUBSTADT	MIAMIAN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	47.41	79.68	0.00	0.00	I
RRRG	FALL PLOW		X	33.07	63.38	14.33	-16.30	-1.14
RRG	FALL PLOW		X	28.66	57.92	18.74	-21.76	-1.16
RRGMM	FALL PLOW		X	15.43	60.00	31.97	-19.68	-.62
RRR	SPRING PLOW		X	41.89	83.70	5.51	4.02	.73
RRRG	SPRING PLOW		X	28.66	66.34	18.74	-13.33	-.71
RRG	SPRING PLOW		X	25.36	60.56	22.05	-19.12	-.87
RRGMM	SPRING PLOW		X	12.13	61.60	35.28	-18.08	-.51
RRR	CHISEL DISC		X	14.11	91.77	33.30	12.09	.36
RRRG	CHISEL DISC		X	12.35	72.40	35.06	-7.28	-.21
RRG	CHISEL DISC		X	11.80	65.95	35.61	-13.73	-.39
RRGMM	CHISEL DISC		X	7.28	64.83	40.13	-14.85	-.37
RRR	NO TIL		X	7.72	105.75	39.69	26.07	.66
RRRG	NO TIL		X	6.28	82.91	41.12	3.23	.08
RRG	NO TIL		X	5.95	75.28	41.45	-4.40	-.11
RRGMM	NO TIL		X	4.41	70.42	43.00	-9.26	-.22

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	V	BOSTON	RODMAN
CLASS	IVE	CASCO	
SLOPE	D	ELDEAN (FOX)	
T-VALUE	3.1	MUSKINGUM	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	52.16	56.77	0.00	0.00	I
RRRG	FALL PLOW		X	36.39	43.32	15.77	-13.46	-.85
RRG	FALL PLOW		X	31.54	38.88	20.62	-17.90	-.87
RRGMM	FALL PLOW		X	16.98	48.59	35.18	-8.18	-.23
RRR	SPRING PLOW		X	46.09	56.76	6.06	-.01	-.00
RRRG	SPRING PLOW		X	31.54	43.37	20.62	-13.40	-.65
RRG	SPRING PLOW		X	27.90	38.88	24.26	-17.90	-.74
RRGMM	SPRING PLOW		X	13.34	48.62	38.81	-8.15	-.21
RRR	CHISEL DISC		X	15.53	66.22	36.63	9.44	.26
RRRG	CHISEL DISC		X	13.59	50.45	38.57	-6.32	-.16
RRG	CHISEL DISC		X	12.98	45.17	39.18	-11.60	-.30
RRGMM	CHISEL DISC		X	8.01	52.40	44.15	-4.37	-.10
RRR	NO TIL		X	8.49	75.26	43.67	18.49	.42
RRRG	NO TIL		X	6.91	57.22	45.24	.45	.01
RRG	NO TIL		X	6.55	51.21	45.61	-5.56	-.12
RRGMM	NO TIL		X	4.85	56.01	47.31	-.76	-.02

Table B.1 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	W	ALTAS	LAWSHE	ROSSMOYNE
CLASS	IVE	GUERNSEY	NEGLEY	
SLOPE	D	HICKORY	OPEQUON	
T-VALUE	2.6	LATHAM	RARDEN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	52.71	52.60	0.00	0.00	I
RRRG	FALL PLOW		X	36.78	42.46	15.94	-10.15	-.64
RRG	FALL PLOW		X	31.87	39.29	20.84	-13.32	-.64
RRGM	FALL PLOW		X	20.84	38.24	31.87	-14.37	-.45
RRGMM	FALL PLOW		X	17.16	48.57	35.55	-4.03	-.11
RRR	SPRING PLOW		X	46.58	64.87	6.13	12.26	2.00
RRRG	SPRING PLOW		X	31.87	51.54	20.84	-1.07	-.05
RRG	SPRING PLOW		X	28.20	47.19	24.52	-5.41	-.22
RRGM	SPRING PLOW		X	17.16	44.33	35.55	-8.28	-.23
RRGMM	SPRING PLOW		X	13.49	53.51	39.23	.91	.02
RRR	CHISEL DISC		X	15.69	78.74	37.02	26.14	.71
RRRG	CHISEL DISC		X	13.73	61.98	38.98	9.37	.24
RRG	CHISEL DISC		X	13.12	56.51	39.60	3.90	.10
RRGM	CHISEL DISC		X	10.05	51.27	42.66	-1.33	-.03
RRGMM	CHISEL DISC		X	8.09	59.06	44.62	6.45	.14
RRR	NO TIL		X	8.58	78.02	44.13	25.42	.58
RRRG	NO TIL		X	6.99	61.42	45.73	8.82	.19
RRG	NO TIL		X	6.62	56.06	46.09	3.45	.07
RRGM	NO TIL		X	5.15	50.90	47.57	-1.70	-.04
RRGMM	NO TIL		X	4.90	58.78	47.81	6.17	.13

Table B.1 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
UPPER AREA, CENTRAL OHIO RIVER BASIN

SRG	X	ALEXANDRIA
CLASS	VI	LATHAM
SLOPE		MIAMIAN
T-VALUE	3.5	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	99.28	10.89	0.00	0.00	I
RRGMM	FALL PLOW		X	32.32	25.54	66.96	14.65	.22
RRR	SPRING PLOW		X	87.74	10.89	11.54	0.00	0.00
RRGMM	SPRING PLOW		X	25.40	25.54	73.89	14.65	.20
RRR	CHISEL DISC		X	29.55	15.52	69.73	4.63	.07
RRGMM	CHISEL DISC		X	15.24	27.39	84.04	16.50	.20

Table B.2

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	A	CHAGRIN	POPE
CLASS	I-	GENESEE	ROSS
SLOPE	A	HUNTINGTON	TIOGA
T-VALUE	4.8	NOLIN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	4.88	85.06	0.00	0.00	I
RRR	FALL PLOW CONT	X		2.93	93.89	1.95	8.83	4.52
RRG	FALL PLOW	X		2.95	75.72	1.93	-9.34	-4.84
RRG	FALL PLOW CONT	X		1.77	65.66	3.11	-19.40	-6.24
RRGM	FALL PLOW	X		1.93	75.70	2.95	-9.36	-3.17
RRGM	FALL PLOW CONT	X		1.16	66.89	3.72	-18.17	-4.88
RRGMM	FALL PLOW	X		1.59	74.55	3.29	-10.51	-3.19
RRGMM	FALL PLOW CONT	X		.95	67.76	3.93	-17.30	-4.40
RGMMM	FALL PLOW	X		.47	65.14	4.42	-19.92	-4.51
RGMMM	FALL PLOW CONT	X		.28	61.64	4.60	-23.42	-5.09
RRR	SPRING PLOW	X		4.31	110.01	.57	24.95	43.96
RRR	SPRING PLOW CONT	X		2.59	94.46	2.29	9.40	4.10
RRG	SPRING PLOW	X		2.61	75.80	2.27	-9.25	-4.08
RRG	SPRING PLOW CONT	X		1.57	65.44	3.31	-19.61	-5.92
RRGM	SPRING PLOW	X		1.59	75.76	3.29	-9.30	-2.82
RRGM	SPRING PLOW CONT	X		.95	67.98	3.93	-17.08	-4.35
RRGMM	SPRING PLOW	X		1.25	74.67	3.63	-10.39	-2.86
RRGMM	SPRING PLOW CONT	X		.75	68.44	4.13	-16.62	-4.02
RGMMM	SPRING PLOW	X		.40	65.10	4.48	-19.96	-4.45
RGMMM	SPRING PLOW CONT	X		.24	61.98	4.64	-23.08	-4.97
RRR	CHISEL DISC	X		2.21	102.52	2.67	17.47	6.55
RRG	CHISEL DISC	X		1.48	70.81	3.41	-14.25	-4.18
RRGM	CHISEL DISC	X		1.12	72.01	3.76	-13.04	-3.47
RRGMM	CHISEL DISC	X		.91	71.67	3.97	-13.39	-3.37
RGMMM	CHISEL DISC	X		.28	63.60	4.60	-21.46	-4.67
RRR	NO TIL	X		1.54	96.74	3.34	11.68	3.50
RRG	NO TIL	X		.86	66.95	4.02	-18.11	-4.51
RRGM	NO TIL	X		.66	69.12	4.22	-15.94	-3.77
RRGMM	NO TIL	X		.53	69.36	4.35	-15.70	-3.61
RGMMM	NO TIL	X		.17	62.44	4.71	-22.61	-4.80

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	B	CHAGRIN	NEWARK	SKIDMORE
CLASS	IIW(S)	GENESEE	ORVILLE	STENDAL
SLOPE	A	LINDSIDE	PHILO	
T-VALUE	4.9	MOSHANNON	POPE	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	5.84	85.23	0.00	0.00	I
RRR	FALL PLOW CONT	X		3.50	94.68	2.33	9.45	4.05
RRG	FALL PLOW	X		3.53	71.67	2.31	-13.56	-5.88
RRG	FALL PLOW CONT	X		2.12	60.14	3.72	-25.09	-6.75
RRGM	FALL PLOW	X		2.31	71.78	3.53	-13.45	-3.81
RRGM	FALL PLOW CONT	X		1.38	63.93	4.45	-21.30	-4.79
RRGMM	FALL PLOW	X		1.90	70.28	3.94	-14.95	-3.80
RRGMM	FALL PLOW CONT	X		1.14	63.86	4.70	-21.37	-4.55
RGMM	FALL PLOW	X		.69	60.26	5.14	-24.97	-4.85
RGMM	FALL PLOW CONT	X		.42	55.95	5.42	-29.28	-5.40
RGMMM	FALL PLOW	X		.56	59.40	5.28	-25.83	-4.89
RGMMM	FALL PLOW CONT	X		.33	56.31	5.50	-28.92	-5.26
RRR	SPRING PLOW		X	5.16	85.23	.68	.00	.00
RRR	SPRING PLOW CONT	X		3.09	94.49	2.74	9.26	3.38
RRG	SPRING PLOW	X		3.12	71.72	2.71	-13.51	-4.98
RRG	SPRING PLOW CONT	X		1.87	61.81	3.96	-23.42	-5.91
RRGM	SPRING PLOW	X		1.90	71.81	3.94	-13.42	-3.41
RRGM	SPRING PLOW CONT	X		1.14	64.19	4.70	-21.04	-4.48
RRGMM	SPRING PLOW	X		1.49	70.28	4.34	-14.95	-3.44
RRGMM	SPRING PLOW CONT	X		.90	64.05	4.94	-21.18	-4.29
RGMM	SPRING PLOW	X		.57	60.29	5.27	-24.94	-4.74
RGMM	SPRING PLOW CONT	X		.34	56.65	5.49	-28.58	-5.20
RGMMM	SPRING PLOW	X		.47	59.40	5.36	-25.83	-4.82
RGMMM	SPRING PLOW CONT	X		.28	56.30	5.55	-28.93	-5.21
RRR	CHISEL DISC	X		2.65	111.76	3.19	26.53	8.32
RRG	CHISEL DISC	X		1.76	72.83	4.07	-12.40	-3.05
RRGM	CHISEL DISC	X		1.34	72.64	4.49	-12.59	-2.80
RRGMM	CHISEL DISC	X		1.09	70.95	4.75	-14.28	-3.01
RGMM	CHISEL DISC	X		.41	60.70	5.43	-24.53	-4.52
RGMMM	CHISEL DISC	X		.34	59.73	5.50	-25.49	-4.64
RRR	NO TIL	X		1.85	104.99	3.99	19.76	4.95
RRG	NO TIL	X		1.03	68.30	4.80	-16.93	-3.52
RRGM	NO TIL	X		.79	69.27	5.05	-15.96	-3.16
RRGMM	NO TIL	X		.64	68.23	5.20	-17.00	-3.27
RGMM	NO TIL	X		.27	59.00	5.56	-26.23	-4.71
RGMMM	NO TIL	X		.20	58.39	5.63	-26.84	-4.77

Table B.2 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	C	DUNNING	PEOGA
CLASS	IIIW	HOLLY	
SLOPE	A	KILLBUCK	
T-VALUE	5.0	MELVIN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW	X		3.78	70.04	0.00	0.00	I
RRG	FALL PLOW	X		2.29	41.03	1.50	-29.01	-19.39
RRGM	FALL PLOW	X		1.50	38.78	2.29	-31.26	-13.67
RGMM	FALL PLOW	X		.45	31.44	3.33	-38.60	-11.58
RGMMM	FALL PLOW	X		.36	31.64	3.42	-38.39	-11.22
RRR	SPRING PLOW	X		3.34	70.05	.44	.01	.03
RRG	SPRING PLOW	X		2.02	41.38	1.76	-28.66	-16.29
RRGM	SPRING PLOW	X		1.23	39.03	2.55	-31.00	-12.15
RGMM	SPRING PLOW	X		.37	31.57	3.41	-38.47	-11.27
RGMMM	SPRING PLOW	X		.31	31.75	3.48	-38.29	-11.02
RRR	CHISEL DISC	X		1.72	68.66	2.07	-1.38	-.67
RRG	CHISEL DISC	X		1.14	40.31	2.64	-29.73	-11.26
RRGM	CHISEL DISC	X		.87	38.23	2.91	-31.80	-10.92
RGMM	CHISEL DISC	X		.26	31.17	3.52	-38.87	-11.05
RGMMM	CHISEL DISC	X		.22	31.43	3.56	-38.61	-10.84
RRR	NO TIL	X		1.20	68.95	2.59	-1.08	-.42
RRG	NO TIL	X		.67	40.68	3.11	-29.35	-9.42
RRGM	NO TIL	X		.51	38.52	3.27	-31.52	-9.63
RGMM	NO TIL	X		.18	31.31	3.61	-38.73	-10.74
RGMMM	NO TIL	X		.13	31.54	3.65	-38.50	-10.54

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	E	ALLEGHENY	MENTOR	WHEELING
CLASS	I-	ASHTON	OTWELL	
SLOPE	A	LAIDIG	PARKE	
T-VALUE	4.2	LOUDON	SCIOTOVILLE	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW	X		3.70	129.43	0.00	0.00	I
RRGM	FALL PLOW	X		1.46	85.17	2.24	-44.26	-19.77
RRGMM	FALL PLOW	X		1.21	82.18	2.50	-47.25	-18.92
RGMMM	FALL PLOW	X		.35	68.72	3.35	-60.71	-18.13
RRR	SPRING PLOW	X		3.27	129.44	.43	.01	.03
RRGM	SPRING PLOW	X		1.21	85.11	2.50	-44.32	-17.75
RRGMM	SPRING PLOW	X		.95	82.16	2.76	-47.27	-17.16
RGMMM	SPRING PLOW	X		.30	68.69	3.40	-60.74	-17.86
RRR	CHISEL DISC	X		1.68	129.98	2.02	.55	.27
RRGM	CHISEL DISC	X		.85	85.40	2.85	-44.03	-15.45
RRGMM	CHISEL DISC	X		.69	82.38	3.01	-47.05	-15.61
RGMMM	CHISEL DISC	X		.22	68.81	3.49	-60.62	-17.38
RRR	NO TIL	X		1.17	125.78	2.53	-3.65	-1.44
RRGM	NO TIL	X		.50	83.30	3.20	-46.13	-14.40
RRGMM	NO TIL	X		.40	80.70	3.30	-48.73	-14.78
RGMMM	NO TIL	X		.13	67.97	3.57	-61.46	-17.20

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	G	ALEXANDRIA	COLERAIN	OTWELL	VINCENT
CLASS	IIE	ALLEGHENY	GLENFORD	PARKE	WHEELING
SLOPE	B	CANA	MENTOR	PIKE	WILLIAMSBURG
T-VALUE	3.7	CARDINGTON	MONONGAHELA	SCIOTOVILLE	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	15.00	68.41	0.00	0.00	I
RRG	FALL PLOW		X	9.07	44.05	5.93	-24.35	-4.11
RRGM	FALL PLOW		X	5.93	49.05	9.07	-19.35	-2.13
RRGM	FALL PLOW CONT	X		2.96	57.47	12.03	-10.93	-.91
RRGMM	FALL PLOW		X	4.88	52.68	10.12	-15.72	-1.55
RRGMM	FALL PLOW CONT	X		2.44	58.70	12.56	-9.70	-.77
RGMM	FALL PLOW	X		1.78	56.04	13.22	-12.36	-.94
RGMM	FALL PLOW CONT	X		.89	52.53	14.11	-15.87	-1.13
RGMMM	FALL PLOW	X		1.43	56.00	13.57	-12.41	-.91
RGMMM	FALL PLOW CONT	X		.72	53.22	14.28	-15.19	-1.06
RRR	SPRING PLOW		X	13.25	68.40	1.74	-.01	-.00
RRG	SPRING PLOW		X	8.02	44.05	6.98	-24.36	-3.49
RRGM	SPRING PLOW		X	4.88	49.15	10.12	-19.25	-1.90
RRGM	SPRING PLOW CONT	X		2.44	60.66	12.56	-7.74	-.62
RRGMM	SPRING PLOW		X	3.84	52.79	11.16	-15.62	-1.40
RRGMM	SPRING PLOW CONT	X		1.92	61.34	13.08	-7.06	-.54
RGMM	SPRING PLOW	X		1.47	56.08	13.53	-12.32	-.91
RGMM	SPRING PLOW CONT	X		.73	54.10	14.27	-14.30	-1.00
RGMMM	SPRING PLOW	X		1.22	56.05	13.78	-12.36	-.90
RGMMM	SPRING PLOW CONT	X		.61	54.45	14.39	-13.96	-.97
RRR	CHISEL DISC		X	6.80	80.19	8.20	11.78	1.44
RRG	CHISEL DISC		X	4.53	51.02	10.46	-17.38	-1.66
RRGM	CHISEL DISC	X		3.45	69.21	11.55	.81	.07
RRGMM	CHISEL DISC	X		2.79	68.20	12.21	-.20	-.02
RGMM	CHISEL DISC	X		1.05	58.16	13.95	-10.24	-.73
RGMMM	CHISEL DISC	X		.87	57.71	14.13	-10.70	-.76
RRR	NO TIL		X	4.74	92.50	10.26	24.09	2.35
RRG	NO TIL	X		2.65	75.31	12.35	6.90	.56
RRGM	NO TIL	X		2.02	76.67	12.98	8.27	.64
RRGMM	NO TIL	X		1.64	74.19	13.36	5.78	.43
RGMM	NO TIL	X		.70	61.73	14.30	-6.68	-.47
RGMMM	NO TIL	X		.52	60.56	14.48	-7.85	-.54

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	H	ALFORD	JESSUP	MUSKINGUM
CLASS	IIE	ELDEAN (FOX)	LOUDON	TILSIT
SLOPE	B	GILPIN	LOWELL	WELLSTON
T-VALUE	3.6	HAYTER	MUREN	ZANESVILLE

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	15.57	84.32	0.00	0.00	I
RRG	FALL PLOW		X	9.41	56.16	6.15	-28.16	-4.58
RRGM	FALL PLOW		X	6.15	54.05	9.41	-30.28	-3.22
RRGM	FALL PLOW CONT	X		3.08	67.84	12.49	-16.48	-1.32
RRGMM	FALL PLOW		X	5.07	58.49	10.50	-25.83	-2.46
RRGMM	FALL PLOW CONT	X		2.53	68.35	13.03	-15.97	-1.23
RGMM	FALL PLOW	X		1.85	65.15	13.72	-19.17	-1.40
RGMM	FALL PLOW CONT	X		.92	61.29	14.64	-23.03	-1.57
RGMMM	FALL PLOW	X		1.48	64.52	14.08	-19.81	-1.41
RGMMM	FALL PLOW CONT	X		.74	61.46	14.82	-22.86	-1.54
RRR	SPRING PLOW		X	13.76	84.31	1.81	-.01	-.01
RRG	SPRING PLOW		X	8.33	56.05	7.24	-28.27	-3.90
RRGM	SPRING PLOW		X	5.07	54.29	10.50	-30.03	-2.86
RRGM	SPRING PLOW CONT	X		2.53	67.86	13.03	-16.46	-1.26
RRGMM	SPRING PLOW		X	3.98	58.47	11.58	-25.85	-2.23
RRGMM	SPRING PLOW CONT	X		1.99	68.37	13.58	-15.95	-1.17
RGMM	SPRING PLOW	X		1.52	65.07	14.05	-19.25	-1.37
RGMM	SPRING PLOW CONT	X		.76	61.31	14.81	-23.02	-1.55
RGMMM	SPRING PLOW	X		1.27	64.48	14.30	-19.84	-1.39
RGMMM	SPRING PLOW CONT	X		.63	61.46	14.93	-22.86	-1.53
RRR	CHISEL DISC		X	7.06	90.97	8.51	6.65	.78
RRG	CHISEL DISC		X	4.71	60.28	10.86	-24.04	-2.21
RRGM	CHISEL DISC	X		3.58	76.01	11.98	-8.31	-.69
RRGMM	CHISEL DISC	X		2.90	74.95	12.67	-9.38	-.74
RGMM	CHISEL DISC	X		1.09	65.27	14.48	-19.05	-1.32
RGMMM	CHISEL DISC	X		.91	64.63	14.66	-19.69	-1.34
RRR	NO TIL		X	4.92	105.12	10.64	20.79	1.95
RRG	NO TIL	X		2.75	82.67	12.81	-1.65	-.13
RRGM	NO TIL	X		2.10	83.51	13.47	-.82	-.06
RRGMM	NO TIL	X		1.70	81.16	13.86	-3.16	-.23
RGMM	NO TIL	X		.72	69.02	14.84	-15.30	-1.03
RGMMM	NO TIL	X		.54	67.63	15.02	-16.69	-1.11

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	I	BEASLEY	CHILI	CORYDON	ROSSMOYNE
CLASS	IIE	BEDFORD	CINCINNATI	GUERNSEY	WESTMORELAND
SLOPE	B	BRATTON	CLYMER	HEITT	WOODSFIELD
T-VALUE	3.7	CEDARVILLE	COOLVILLE	RARDEN	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	15.04	69.08	0.00	0.00	I
RRG	FALL PLOW		X	9.09	44.06	5.95	-25.02	-4.21
RRGM	FALL PLOW		X	5.95	48.28	9.09	-20.80	-2.29
RRGM	FALL PLOW CONT	X		2.97	55.88	12.07	-13.20	-1.09
RRGMM	FALL PLOW		X	4.90	52.11	10.14	-16.97	-1.67
RRGMM	FALL PLOW CONT	X		2.45	58.26	12.59	-10.82	-.86
RGMM	FALL PLOW	X		1.78	55.07	13.25	-14.01	-1.06
RGMM	FALL PLOW CONT	X		.89	51.70	14.15	-17.38	-1.23
RGMMM	FALL PLOW	X		1.43	55.31	13.60	-13.78	-1.01
RGMMM	FALL PLOW CONT	X		.72	52.71	14.32	-16.37	-1.14
RRR	SPRING PLOW		X	13.29	69.03	1.75	-.06	-.03
RRG	SPRING PLOW		X	8.04	43.98	6.99	-25.11	-3.59
RRGM	SPRING PLOW		X	4.90	48.55	10.14	-20.54	-2.03
RRGM	SPRING PLOW CONT	X		2.45	56.42	12.59	-12.67	-1.01
RRGMM	SPRING PLOW		X	3.85	52.08	11.19	-17.00	-1.52
RRGMM	SPRING PLOW CONT	X		1.92	57.91	13.11	-11.17	-.85
RGMM	SPRING PLOW	X		1.47	55.19	13.57	-13.89	-1.02
RGMM	SPRING PLOW CONT	X		.73	51.96	14.30	-17.13	-1.20
RGMMM	SPRING PLOW	X		1.22	55.21	13.81	-13.87	-1.00
RGMMM	SPRING PLOW CONT	X		.61	52.81	14.43	-16.27	-1.13
RRR	CHISEL DISC		X	6.82	87.10	8.22	18.02	2.19
RRG	CHISEL DISC		X	4.55	55.66	10.49	-13.43	-1.28
RRGM	CHISEL DISC	X		3.46	66.42	11.58	-2.66	-.23
RRGMM	CHISEL DISC	X		2.80	66.00	12.24	-3.08	-.25
RGMM	CHISEL DISC	X		1.05	56.69	13.99	-12.39	-.89
RGMMM	CHISEL DISC	X		.87	56.41	14.16	-12.67	-.89
RRR	NO TIL		X	4.76	92.50	10.28	23.41	2.28
RRG	NO TIL	X		2.66	75.29	12.38	6.21	.50
RRGM	NO TIL	X		2.03	77.16	13.01	8.08	.62
RRGMM	NO TIL	X		1.64	74.58	13.39	5.49	.41
RGMM	NO TIL	X		.70	61.78	14.34	-7.31	-.51
RGMMM	NO TIL	X		.52	60.55	14.51	-8.53	-.59

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	K	AVONBURG	TAGGART
CLASS	IIW	BEDFORD	TILSIT
SLOPE	A	COOLVILLE	TYLER
T-VALUE	4.0	DUBOIS	WEINBACH

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	FALL PLOW		X	5.63	73.22	0.00	0.00	I
RRG	FALL PLOW	X		3.41	31.48	2.23	-41.74	-18.74
RRGM	FALL PLOW	X		2.23	36.82	3.41	-36.40	-10.68
RRGMM	FALL PLOW	X		1.83	40.54	3.80	-32.68	-8.60
RGMM	FALL PLOW	X		.67	37.28	4.97	-35.94	-7.24
RGMMM	FALL PLOW	X		.54	38.58	5.10	-34.64	-6.80
RRR	SPRING PLOW		X	4.98	73.05	.66	-.17	-.26
RRG	SPRING PLOW	X		3.01	63.29	2.62	-9.93	-3.79
RRGM	SPRING PLOW	X		1.83	60.68	3.80	-12.54	-3.30
RRGMM	SPRING PLOW	X		1.44	58.99	4.19	-14.23	-3.39
RGMM	SPRING PLOW	X		.55	48.74	5.08	-24.48	-4.82
RGMMM	SPRING PLOW	X		.46	47.84	5.18	-25.38	-4.90
RRR	CHISEL DISC	X		2.56	108.20	3.08	34.98	11.36
RRG	CHISEL DISC	X		1.70	68.65	3.93	-4.57	-1.16
RRGM	CHISEL DISC	X		1.30	64.71	4.34	-8.51	-1.96
RRGMM	CHISEL DISC	X		1.05	62.24	4.59	-10.98	-2.39
RGMM	CHISEL DISC	X		.39	50.76	5.24	-22.46	-4.29
RGMMM	CHISEL DISC	X		.33	49.45	5.31	-23.77	-4.48
RRR	NO TIL	X		1.78	88.33	3.85	15.11	3.92
RRG	NO TIL	X		1.00	55.40	4.64	-17.82	-3.84
RRGM	NO TIL	X		.76	54.77	4.87	-18.45	-3.79
RRGMM	NO TIL	X		.62	54.29	5.02	-18.93	-3.77
RGMM	NO TIL	X		.26	45.81	5.37	-27.41	-5.10
RGMMM	NO TIL	X		.20	45.49	5.44	-27.73	-5.10

Table B.2 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	N	ALEXANDRIA	ELKINSVILLE	MARKLAND	PARKE	WHEELING
CLASS	IIIE	ALLEGHENY	GALLIA	MENTOR	PIKE	WILLIAMSBURG
SLOPE	C	CARDINGTON	LICKING	MONONGAHELA	POPE	
T-VALUE	3.7	COLERAIN	LOUDONVILLE	OTWELL	VINCENT	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	36.93	45.48	0.00	0.00	I
RRG	FALL PLOW		X	22.33	27.27	14.60	-18.20	-1.25
RRGMM	FALL PLOW		X	12.02	44.23	24.90	-1.24	-.05
RGMM	FALL PLOW		X	4.38	44.16	32.55	-1.31	-.04
RGMM	FALL PLOW CONT	X		2.63	45.78	34.30	.31	.01
RGMMM	FALL PLOW	X		3.52	52.87	33.41	7.39	.22
RGMMM	FALL PLOW CONT	X		2.11	47.72	34.81	2.24	.06
RRR	SPRING PLOW		X	32.63	45.48	4.29	.00	.00
RRG	SPRING PLOW		X	19.75	27.28	17.18	-18.19	-1.06
RRGMM	SPRING PLOW		X	9.45	44.23	27.48	-1.25	-.05
RGMM	SPRING PLOW	X		3.61	52.54	33.32	7.06	.21
RGMM	SPRING PLOW CONT	X		2.16	45.80	34.76	.32	.01
RGMMM	SPRING PLOW	X		3.01	52.84	33.92	7.37	.22
RGMMM	SPRING PLOW CONT	X		1.80	47.72	35.12	2.24	.06
RRR	CHISEL DISC		X	16.75	49.41	20.18	3.93	.19
RRG	CHISEL DISC		X	11.16	29.90	25.76	-15.58	-.60
RRGMM	CHISEL DISC		X	6.87	45.80	30.06	.32	.01
RGMM	CHISEL DISC	X		2.58	53.56	34.35	8.08	.24
RGMMM	CHISEL DISC	X		2.15	53.62	34.78	8.14	.23
RRR	NO TIL		X	11.68	53.68	25.25	8.20	.32
RRG	NO TIL		X	6.53	32.70	30.40	-12.77	-.42
RRGMM	NO TIL		X	4.04	47.50	32.89	2.03	.06
RGMM	NO TIL	X		1.72	55.56	35.21	10.09	.29
RGMMM	NO TIL	X		1.29	55.15	35.64	9.68	.27

Table B.2 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	0	DE KALB	JESSUP	RAYNE	ZALESKI
CLASS	IIIE	GILPIN	LOUDON	RIGLEY	ZANESVILLE
SLOPE	C	HAYTER	LOWELL	WELLSTON	
T-VALUE	3.6	HAZELTON	MUSKINGUM	WOOLPER	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	43.79	51.42	0.00	0.00	I
RRG	FALL PLOW		X	26.48	32.08	17.31	-19.34	-1.12
RRGM	FALL PLOW		X	17.31	42.37	26.48	-9.05	-.34
RRGMM	FALL PLOW		X	14.26	46.67	29.53	-4.75	-.16
RGMM	FALL PLOW		X	5.19	45.13	38.59	-6.30	-.16
RGMM	FALL PLOW CONT	X		3.12	46.27	40.67	-5.16	-.13
RGMMM	FALL PLOW		X	4.18	47.58	39.61	-3.84	-.10
RGMMM	FALL PLOW CONT	X		2.51	47.89	41.28	-3.53	-.09
RRR	SPRING PLOW		X	38.70	51.34	5.09	-.08	-.02
RRG	SPRING PLOW		X	23.42	32.11	20.37	-19.31	-.95
RRGM	SPRING PLOW		X	14.26	42.33	29.53	-9.09	-.31
RRGMM	SPRING PLOW		X	11.20	46.68	32.59	-4.74	-.15
RGMM	SPRING PLOW		X	4.28	45.11	39.51	-6.31	-.16
RGMM	SPRING PLOW CONT	X		2.57	46.29	41.22	-5.13	-.12
RGMMM	SPRING PLOW	X		3.56	53.22	40.22	1.80	.04
RGMMM	SPRING PLOW CONT	X		2.14	47.89	41.65	-3.54	-.08
RRR	CHISEL DISC		X	19.86	65.62	23.93	14.20	.59
RRG	CHISEL DISC		X	13.24	41.60	30.55	-9.82	-.32
RRGM	CHISEL DISC		X	10.08	49.46	33.71	-1.96	-.06
RRGMM	CHISEL DISC		X	8.15	52.38	35.64	.96	.03
RGMM	CHISEL DISC	X		3.05	55.34	40.73	3.92	.10
RGMMM	CHISEL DISC	X		2.55	54.17	41.24	2.75	.07
RRR	NO TIL		X	13.85	92.42	29.94	41.00	1.37
RRG	NO TIL		X	7.74	59.52	36.05	8.10	.22
RRGM	NO TIL		X	5.91	62.86	37.88	11.44	.30
RRGMM	NO TIL		X	4.79	63.12	39.00	11.70	.30
RGMM	NO TIL	X		2.04	64.60	41.75	13.18	.32
RGMMM	NO TIL	X		1.53	60.54	42.26	9.12	.22

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	P	BEASLEY	CINCINNATI	EDENTON	KEENE	PEMBROKE	TUSCARAWAS
CLASS	IIIE	BEDFORD	CLYMER	GUERNSEY	LATHAM	RARDEN	WESTMORELAND
SLOPE	C	BRATTON	COOLVILLE	HAGERSTOWN	LAWSHE	ROSSMOYNE	WOODSFIELD
T-VALUE	3.3	CHILI	CULLEOKA	HEITT	OPEQUON	SHELOCTA	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRR	SPRING PLOW		X	40.40	41.65	NA	NA	NA
RRG	SPRING PLOW		X	24.45	24.74	NA	NA	NA
RRGM	SPRING PLOW		X	14.88	35.97	NA	NA	NA
RRGMM	SPRING PLOW		X	11.69	40.25	NA	NA	NA
RGMM	SPRING PLOW		X	4.47	39.76	NA	NA	NA
RGMM	SPRING PLOW CONT	X		2.68	40.67	NA	NA	NA
RGMMM	SPRING PLOW		X	3.72	42.53	NA	NA	NA
RGMMM	SPRING PLOW CONT	X		2.23	42.88	NA	NA	NA
RRR	CHISEL DISC		X	20.73	55.49	NA	NA	NA
RRG	CHISEL DISC		X	13.82	34.48	NA	NA	NA
RRGM	CHISEL DISC		X	10.53	38.20	NA	NA	NA
RRGMM	CHISEL DISC		X	8.51	46.09	NA	NA	NA
RGMM	CHISEL DISC	X		3.19	47.11	NA	NA	NA
RGMMM	CHISEL DISC	X		2.66	48.04	NA	NA	NA
RRR	NO TIL		X	14.46	82.78	NA	NA	NA
RRG	NO TIL		X	8.08	52.11	NA	NA	NA
RRGMM	NO TIL		X	5.00	56.66	NA	NA	NA
RGMM	NO TIL	X		2.13	57.17	NA	NA	NA
RGMMM	NO TIL	X		1.59	56.18	NA	NA	NA

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG R BENTONVILLE
CLASS IIIW,IVW PURDY
SLOPE A TYLER
T-VALUE 3.0

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	6.46	58.18	0.00	0.00	I
RRG	FALL PLOW CONT	X		2.34	40.24	4.12	-17.94	-4.36
RRGM	FALL PLOW CONT	X		1.53	42.81	4.93	-15.37	-3.12
RRGMM	FALL PLOW CONT	X		1.26	44.81	5.20	-13.37	-2.57
RRR	SPRING PLOW		X	5.71	58.18	.75	0.00	0.00
RRG	SPRING PLOW CONT	X		2.07	40.24	4.39	-17.94	-4.09
RRGM	SPRING PLOW CONT	X		1.26	42.81	5.20	-15.37	-2.96
RRGMM	SPRING PLOW CONT	X		.99	44.81	5.47	-13.37	-2.44
RRR	CHISEL DISC	X		2.93	82.66	3.53	24.48	6.93

Table B.2 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	U	ALLEGHENY	LOUDONVILLE
CLASS	IVE	GALLIA	MARKLAND
SLOPE	D	HANOVER	PARKE
T-VALUE	4.1	LICKING	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRGMM	FALL PLOW		X	23.83	19.53	NA	NA	NA
RGMM	FALL PLOW		X	8.68	19.36	NA	NA	NA
RGMMM	FALL PLOW		X	6.98	21.97	NA	NA	NA
RRGMM	SPRING PLOW		X	18.73	19.59	NA	NA	NA
RGMM	SPRING PLOW		X	7.15	19.40	NA	NA	NA
RGMMM	SPRING PLOW		X	5.96	22.02	NA	NA	NA
RRGMM	CHISEL DISC		X	13.62	19.03	NA	NA	NA
RGMM	CHISEL DISC		X	5.11	19.05	NA	NA	NA
RGMMM	CHISEL DISC		X	4.26	21.73	NA	NA	NA
RRGMM	NO TIL		X	8.00	24.83	NA	NA	NA
RGMM	NO TIL	X		3.40	30.49	NA	NA	NA
RGMMM	NO TIL	X		2.55	30.89	NA	NA	NA

Table B.2 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	V	BERKS	HAYTER	MUSKINGUM	ZALESKI
CLASS	IVE	DE KALB	JESSUP	RAYNE	
SLOPE	D	GILFIN	LAIDIG	RIGLEY	
T-VALUE	3.3	HAZELTON	LOWELL	WELLSTON	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRGMM	FALL PLOW		X	26.79	16.14	NA	NA	NA
RGMM	FALL PLOW		X	9.76	16.89	NA	NA	NA
RGMMM	FALL PLOW		X	7.84	20.02	NA	NA	NA
RRGMM	SPRING PLOW		X	21.05	15.82	NA	NA	NA
RGMM	SPRING PLOW		X	8.04	17.00	NA	NA	NA
RGMMM	SPRING PLOW		X	6.70	20.04	NA	NA	NA
RRGMM	CHISEL DISC		X	15.31	23.04	NA	NA	NA
RGMM	CHISEL DISC		X	5.74	21.45	NA	NA	NA
RGMMM	CHISEL DISC		X	4.78	23.61	NA	NA	NA
RRGMM	NO TIL		X	8.99	30.02	NA	NA	NA
RGMM	NO TIL		X	3.83	25.80	NA	NA	NA
RGMMM	NO TIL	X		2.87	30.43	NA	NA	NA

Table B.2 (Cont'd) SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	W	BETHESDA	CULLEOKA	GUERNSEY	NEGLEY	VANDALIA
CLASS	IVE	BROOKSIDE	EDENTON	HEITT	RARDEN	WESTMORELAND
SLOPE	D	CINCINNATI	FAIRMONT	LATHAM	TUSCARAWAS	
T-VALUE	3.2	CLYMER	FAIRPOINT	LAWSHE	UPSHUR	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	CHANGE IN NET RETURN PER TON OF SOIL SAVED
RRR	FALL PLOW		X	105.06	28.13	0.00	0.00	I
RRGMM	FALL PLOW		X	34.20	22.53	70.85	-5.60	-.08
RGMMM	FALL PLOW		X	10.02	23.40	95.04	-4.73	-.05
RRR	SPRING PLOW		X	92.84	28.01	12.22	-.12	-.01
RRGMM	SPRING PLOW		X	26.87	22.53	78.18	-5.60	-.07
RGMMM	SPRING PLOW		X	8.55	23.40	96.50	-4.73	-.05
RRR	CHISEL DISC		X	47.64	49.53	57.41	21.40	.37
RRGMM	CHISEL DISC		X	19.55	31.13	85.51	3.00	.04
RGMMM	CHISEL DISC		X	6.11	27.70	98.95	-.42	-.00
RRR	NO TIL		X	33.23	67.57	71.83	39.44	.55
RRGMM	NO TIL		X	11.48	38.34	93.57	10.21	.11
RGMMM	NO TIL		X	3.66	31.31	101.39	3.18	.03

Table B.2 (Cont'd)

SOIL MANAGEMENT ALTERNATIVES - EROSION CONTROL
BASED ON ECONOMIC DEVELOPMENT RUN - YEAR 2000
LOWER AREA, CENTRAL OHIO RIVER BASIN

SRG	X	BERKS
CLASS	VI	UPSHUR
SLOPE		WESTMORELAND
T-VALUE	3.1	

CROP MANAGEMENT SYSTEM		EROSION CONTROL				MANAGEMENT SYSTEM COMPARED WITH RRR FALL PLOW		
ROTATION	TILLAGE SYSTEM	UNDER T	OVER T	SOIL LOSS T/A/YR.	NET RETURN PER ACRE	SOIL SAVED T/A/YR.	CHANGE IN NET RETURN PER ACRE	PER TON OF SOIL SAVED
RRG	FALL PLOW		X	108.78	.12	NA	NA	NA
RRGMM	FALL PLOW		X	58.57	12.50	NA	NA	NA
RGMM	FALL PLOW		X	21.34	12.86	NA	NA	NA
RGMMM	FALL PLOW		X	17.15	15.78	NA	NA	NA
RRG	SPRING PLOW		X	96.23	-.89	NA	NA	NA
RRGMM	SPRING PLOW		X	46.02	12.46	NA	NA	NA
RGMM	SPRING PLOW		X	17.57	12.71	NA	NA	NA
RGMMM	SPRING PLOW		X	14.64	15.78	NA	NA	NA
RRG	CHISEL DISC		X	54.39	11.19	NA	NA	NA
RRGMM	CHISEL DISC		X	33.47	19.59	NA	NA	NA
RGMM	CHISEL DISC		X	12.55	17.19	NA	NA	NA
RGMMM	CHISEL DISC		X	10.46	19.35	NA	NA	NA
RRG	NO TIL		X	31.80	23.68	NA	NA	NA
RRGMM	NO TIL		X	19.66	27.08	NA	NA	NA
RGMM	NO TIL		X	8.37	21.88	NA	NA	NA
RGMMM	NO TIL		X	6.28	23.09	NA	NA	NA

GLOSSARY

ACCELERATED TECHNICAL ASSISTANCE - That amount of additional manpower from a technical agency (such as the USDA Soil Conservation Service) agreed to or needed to accomplish the application of conservation land treatment measures at a faster rate than the current, on-going level of assistance.

ANIMAL UNIT MONTHS (AUM) - The quantity of forage required by one mature cow (1,000 pounds) or the equivalent for one month.

BASE YEAR - Initial study year frame of reference for analytical and comparative purposes by which to compare future projections. Generally in this report the year 1979 was used although in some cases a more recent year was considered appropriate.

BENEFIT-COST RATIO - An economic indicator of efficiency, computed by dividing benefits by costs. Usually both the benefits and the costs are discounted so that the ratio reflects efficiency in terms of the present value of future benefits and costs.

BOARD FOOT - A unit of measure of lumber equal to a board one foot square and one inch thick.

BRUSH - A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low growing trees - regardless of whether some of the components are cropped.

BRUSH MANAGEMENT - Management and manipulation of stands of brush by mechanical, chemical or, biological means or by prescibed burning.

COMMERCIAL FOREST LAND - Forest land that is producing or is capable of producing crops of industrial wood and that is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management to grow crops of industrial wood generally of a site quality capable of producing in excess of 20 cubic feet per acre of annual growth. This includes both inaccessible and inoperable areas.

CONSERVATION - The development, use, and management of soil, water, and related resources in a way that will restore, enhance, protect, and maintain their quality and quantity for the benefit of man and his environment now and in the future.

COST - The negative (adverse) effects. Costs may be monetary, social, physical, or environmental in nature.

ECONOMIC BASE - The economic characteristics (e.g., quantities of resources, demand for products, supply of investment goods, quantity and quality of labor force, marginal capital-output ratio, production relationships, stage of development of the region) that contribute to the region's income and growth and economic trends and cycles of the region. The economic base considers: (1) Basic activities which produce and distribute goods and services for export, and (2) Service activities whose goods and services are consumed within the region.

ENVIRONMENT - The complex of climate, soil, and biotic factors that act upon an organism or ecological community and ultimately determine its form and survival.

ENVIROMENTAL QUALITY (EQ) - Enhancing environmental quality by the management, conservation, preservation, creation, restoration or improvement of the quality of certain national and cultural resources and ecological systems is one of the two main objectives for programs involving water and related land resources administered by federal agencies whose activities involve planning and development of water resources.

EROSION - The group of natural processes whereby earth or rock material is worn away, loosened, or dissolved and removed from any part of the earth's surface. It includes the processes of weathering, dissolution, abrasion, corrosion, and transportation.

EROSION, ACCELERATED - Erosion that can be attributed directly or indirectly to the activities of man.

EROSION PHASE - Degree of accelerated erosion.

Phase

1 Uneroded or slightly eroded. The A1 horizon or the A1 plus A2 (where present) is seven or more inches thick with little or no mixing of subsoil (B horizon) in the plow layer of cultivated areas.

2 Moderately eroded. The A1 horizon or A1 plus A2 (where present) is usually three to seven inches thick. In cultivated areas there is some mixing of subsoil (B horizon) in the Ap horizon, but the plow layer is dominantly A material.

3 Severely eroded. Usually less than three inches of A1 or A2 horizon present. In cultivated areas, the major part of the plow layer is subsoil (B horizon).

FORAGE - That part of the current leaf and twig growth of shrubs, woody vines and trees available for animal consumption and non-woody plants that are available to livestock or game animals used for grazing or harvested for feed.

FOREST LAND - Land at least 16.7 percent stocked by forest trees of any size or formerly having such tree cover, and not currently developed for non-forest use, includes afforested areas. The minimum forest area classified was one acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas were classed as forest if less than 120 feet wide.

GRAZING, DEFERRED - Discontinuance of grazing by livestock on an area for a specified period of time during the growing season to promote plant reproduction, establishment of new plants, or restoration of vigor by old plants.

HABITAT - The natural place of abode of a plant or other organism. The locality where the organism may generally be found and where all essentials for its development and existence are present. A geographic niche. Habitats are described by their geographical boundaries or with such terms as "shady woodland," "banks of streams," or "dry hillsides."

LAND CAPABILITY - The inherent ability of land to be used without permanent damage. Land capability, as ordinarily used in the United States, is an expression of the effect of physical land conditions, including climate, on the total ability to be used without damage for crops that require regular tillage, for grazing, for woodland, and for wildlife.

Land capability involves consideration of (1) the risks of land damage from erosion and other causes, and (2) the difficulties in land use owing to physical land characteristics.

LAND RESOURCE AREA - An area of land reasonably alike in its relationship to agriculture with emphasis on combinations and/or intensities of problems in soil and water conservation.

LAND VOIDING - The process of damaging land by gully action causing this land to be unproductive for agricultural uses. Land voided is that area actually within a gully. Voided land usually has value only for wildlife, recreation, and esthetic uses.

LINEAR PROGRAMMING MODEL - A mathematical method used to determine the most effective allocation of limited resources between competing demands when both the objective (e.g., profit or cost) and the restrictions on its attainment are expressible as a system of linear equalities or inequalities.

NATIONAL ECONOMIC DEVELOPMENT (NED) - One of the two main objectives of planning for water and related land resources by federal agencies whose activities involve planning and development of water resources.

NED reflects increases in the nation's productive output, and output which is partly reflected in a national product and income accounting framework to measure the continuing flow of goods and services into direct consumption or investment.

NET BENEFIT - The net gain from goods and services that improve the welfare of the community as a whole. The net gain is the result of all public and private gains and losses.

NORMALIZED PRICES - The long-term trend of prices expected to be in effect after adjustment for seasonal and cyclical fluctuation. Normalized prices can also be the average price over a series of three or more years.

OBERS PROJECTIONS - National, regional, and subregional demand schedule projections produced by the Office of Business Economics (OBE) (now called the Bureau of Economic Analysis) and Economic Research Service (ERS) under the direction of the Water Resources Council (WRC). These economic projections are available in the WRC "1972 OBERS Projections," and present the council's current views on probable rates of Gross National Product (GNP), employment, productivity, and other factors.

PL-566 PROJECTS - Projects authorized by the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, as amended) allow the U.S. Department of Agriculture to assist sponsoring local organizations to plan and to carry out a program for the development, use, and conservation of the nation's soil and water resources. The primary purpose must be flood prevention, irrigation, or agricultural water management; other purposes such as recreation, fish and wildlife development, municipal and industrial water supply, and other soil and water management measures may also be included. The project must cover a watershed or sub-watershed area of not more than 250,000 acres.

No structure providing more than 12,500 acre-feet of floodwater detention capactiy or more than 25,000 acre-feet of total capacity may be included. Except for land rights, the program may provide federal cost-sharing of all installation costs for flood prevention, and up to 50 percent of installation costs for all other purposes, except municipal and industrial water supply.

POLLUTION - Any substance or energy form (heat, light, noise, etc.) which alters the state of the enviroment from what would naturally occur. Pollution is especially associated with those altered states of the environment which human value judgments have decreed as undesirable.

PRIME FARMLAND - Such land is well suited for producing food, feed, forage, fiber and oilseed crops and is also still available for those uses. These lands include cropland, pastureland, and forest land but not urban land or water. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically.

RECREATION - Leisure time activity such as swimming, picnicking, boating, hunting, and fishing.

RESIDUE USE - Managing plant residues on a year-round basis so that protective amounts of vegetation remain on the soil surface.

RIVER BASIN PLAN - One of the "levels of planning" for water and related land resources planning by federal agencies whose activities involve planning and development of water resources as contained in the Principles and Standards of the U.S. Water Resources Council.

Reconnaissance-level evaluations of water and land resources for selected areas are performed under planning authorities of the Public Law 83-566 and Public Law 87-639. They are directed toward resolving the complex problems identified by framework studies and assessments or other federal-state investigations and terminate in a recommended plan or disclosure of possible alternative plans. They may vary widely in scope and detail; will consider

present and long-range problems with focus on middle term (15 to 25 years) needs and desires; and will involve interested federal, state, and local entities.

ROTATIONS - Systems of planned crop sequence on the same land. They are usually designed to reduce problems associated with erosion, insects, disease, and weeds.

RILL EROSION - An erosion process in which numerous small channels only several inches deep are formed; usually occurs on recently cultivated soils.

SEDIMENT - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity or ice and has come to rest on the earth's surface either above or below sea level.

SHEET EROSION - The removal of a fairly uniform layer of soil from the land by surface runoff water.

SOCIAL BENEFITS - The net benefit considerations of long-range societal values at the regional or national level which might not be taken into account in the profit and loss statement of an individual farmer, forest operator, industrialist, or other private citizen.

The non-monetary and rarely quantifiable returns to society arising from any form of economic activity; e.g., those recreational benefits resulting from the creation of scenic overlook.

SOIL - The loose surface material of the earth, usually consisting of disintegrated rock with an admixture of organic matter and soluble salts. The collection of natural bodies occupying portions of the earth's surface that support plants and that have properties due to the integrated effect of climate and living matter acting upon parent material, as conditioned by relief, over periods of time.

SOIL RESOURCE GROUP - A broad grouping of soils that have similar cropping patterns, yield characteristics, reponses to fertilizers, erosion problems, management problems, and land treatment needs.

TERRACES - A system of water control structures used as soil and water conservation practices. Consists of earth embankment, channel, or a combination embankment and channel constructed across the slope.

TOLERABLE SOIL LOSS - The maximum level of soil erosion that will permit a high level of crop productivity to be sustained economically and indefinitely.

WATERSHED - The total area above a given point on a stream that contributes water to the flow at that point. The entire region drained by a waterway or which drains into a lake or reservoir.

WATERSHED PROTECTION - The combination of complementary practices of land treatment and structural works to maintain or improve total yield, quality, stability of flow of surface and subsurface water, and prevention of damage and loss due to excessive and uncontrolled runoff, flooding, salination, and siltation.

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